









The Journal of  
Laryngology and Otology



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# The Journal of Laryngology and Otology

EDITED BY  
A. LOGAN TURNER AND J. S. FRASER

FOUNDED IN 1887 BY MORELL MACKENZIE  
AND NORRIS WOLFENDEN

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# The Journal of Laryngology and Otology

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## EDITORIAL

WITH the advent of the present number, the *Journal of Laryngology and Otology* enters upon its second year under the new management inaugurated in January 1921, and the initial difficulties coincident with the change of Editorship and with the transference of publication into other hands have now been overcome.

The financial position of the Journal, which has become the property of the profession whose interests it seeks to serve, has been strengthened by the formation of a Limited Liability Company, and a strong Editorial Committee has been elected, representative of the many and varied interests of the specialty in Great Britain and Ireland.

It is gratifying to be able to record the large measure of support which the Journal has received during the past twelve months. The number of subscribers has steadily increased and the circulation of the Journal has, in consequence, become more widely extended. We are emboldened to predict that this will be still further developed during the present year.

The attention of our readers is called to the fact that, although the scientific and clinical contributions which reach us are, in the main, the outcome of the observations and work of British laryngologists and otologists, our pages are accessible to all who may wish to contribute to the advancement of the specialty. It is our desire that the Journal should be thoroughly representative of the best which is produced by all the English-speaking peoples.

The outstanding arrears in connection with the publication

## Editorial

of the Proceedings of the Sections of Laryngology and Otology of the Royal Society of Medicine have now been dealt with. It is hoped, therefore, that in future the Proceedings of the Sections will appear in the Journal without any undue delay. The publication, in a severely curtailed form, of the discussions which took place at the Sectional Meetings during the past three years, a procedure rendered necessary in the circumstances, will no longer be required, and a more detailed and useful account of the transactions will be laid before our readers.

In order to strengthen the section of the Journal dealing with the abstracts of current medical literature, we appeal to the writers of original articles published in Journals which are not on our exchange list, to send a brief synopsis of their work for insertion in our Abstract columns.

We are desirous of continuing the series of Clinical Records and Critical Reviews, which, we have reason to believe, are proving useful and instructive to our readers. There are many subjects which may be dealt with in the form of Critical Reviews, and the Journal will welcome, from time to time, such contributions.

The success of the Journal must continue to depend, however, upon the original articles which appear on its pages. It is evident from a survey of the more recent literature of the specialty, both in this country and overseas, and from the increasing activity which is now noticeable at the Sessions of the various scientific Societies, that the difficulty of conducting investigations which existed during and immediately after the war is rapidly disappearing. A new era of scientific energy lies before us, and it is permissible to hope that the Journal will play its part in the diffusion of the knowledge which is acquired.



## HEMORRHAGE DURING AND AFTER TONSILLECTOMY; SURGICAL PRINCIPLES AND METHODS FOR ITS CONTROL.

By CORNELIUS G. COAKLEY, M.D., New York.

HEMORRHAGE during and after tonsillectomy on adults and to a less degree on children is a cause of great anxiety both to patients and to their parents. Most patients over thirty-five years who have infected tonsils requiring operation admit the necessity and desirability of operation, but state that they "are too old," and usually cite one or more instances of severe post-operative hemorrhage occurring among friends which makes them reluctant to submit to the operation. When asked whether they would fear hemorrhage as a complication of other surgical procedures such as appendectomy, they invariably say "No." It is our contention that age alone is not a factor to be reckoned with in tonsillectomy any more than in any other surgical operation.

We find it quite customary for many operators to attribute excessive hemorrhage after tonsillectomy to bleeders, but if one carefully questions the patient as to whether they bleed excessively following cuts, bruises, or previous surgical procedures which they have undergone, we find that these patients have not bled excessively. There is also an idea among many physicians that before removing the tonsils in adults, the coagulation time should be taken to ascertain whether it is prolonged. We have operated upon many patients with a coagulation period more than double the normal as ascertained by the several laboratory methods, without finding any increase in hemorrhage either at the time of operation or subsequently, with two exceptions, which might probably be accounted for by a high blood pressure, 160 or more. In the absence of a history of hemophilia we assure our patients that the loss of blood during the operation is negligible, that post-operative bleeding is rare, and that it can and will be detected early, and controlled before serious loss of blood occurs.

In order to be able to control hemorrhage in any operated area, one should have a good knowledge of the local blood supply, both arterial and venous. My associate, Dr James W. Babcock, instructor in Oto-Laryngology in the College

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of Physicians and Surgeons, New York City, has made a very pretty dissection of the vessels supplying the tonsillar region (Fig. 1).

After completing the dissection our attention was called to the very excellent article, "Observations on the Palatine Tonsil," by C. W. M. Poynter, M.D., Department of Anatomy, University of Nebraska College of Medicine, Omaha, Nebraska, and published in the 1920 *Transactions of the American Academy of Ophthalmology and Oto-Laryngology*. If we summarise Dr Poynter's and Dr Babcock's observations it will be noted that all the arterial supply of the tonsil comes from the external carotid.

The superior pole of the tonsil is supplied from the descending palatine branch of the internal maxillary and the middle and external portion from the ascending pharyngeal and the ascending palatine arteries; whereas the lower portion of the tonsil and that part of the lateral pharyngeal wall studded with lymphoid tissue below the tonsillar fossa are supplied from the dorsalis linguæ, branches from which sometimes are distributed to the outer portion of the tonsil as high as its middle. The number of small radicles piercing the so-called capsule of the tonsil varies from three or four to seven or eight (Fig. 2).

The return venous supply is composed of a rather large plexus of veins which seem to be assembled partly between the outer layers of the capsule and partly between the capsule and superior constrictor of the pharynx lying just external to the capsule. "The plexus drains into the internal maxillary vein above, into the lingual anteriorly and into the palatine below." There is a confluence of the veins towards the lower pole of the tonsil. Poynter states that "from this point a large vein leads outward to join the pharyngeal plexus or opens directly into the internal jugular vein. The posterior lower pole area becomes therefore the *danger area* for hemorrhage, on account of the size of the vein and its close relation to the capsule. When the vein opens into the jugular the danger of hemorrhage would naturally be greater and the possibility of jugular thrombosis much increased." In our opinion a direct communication with the internal jugular would easily account for a dislodged septic thrombus entering the circulation, and, being deposited in the pulmonary vessels as an embolus, becoming the source of a future lung abscess.

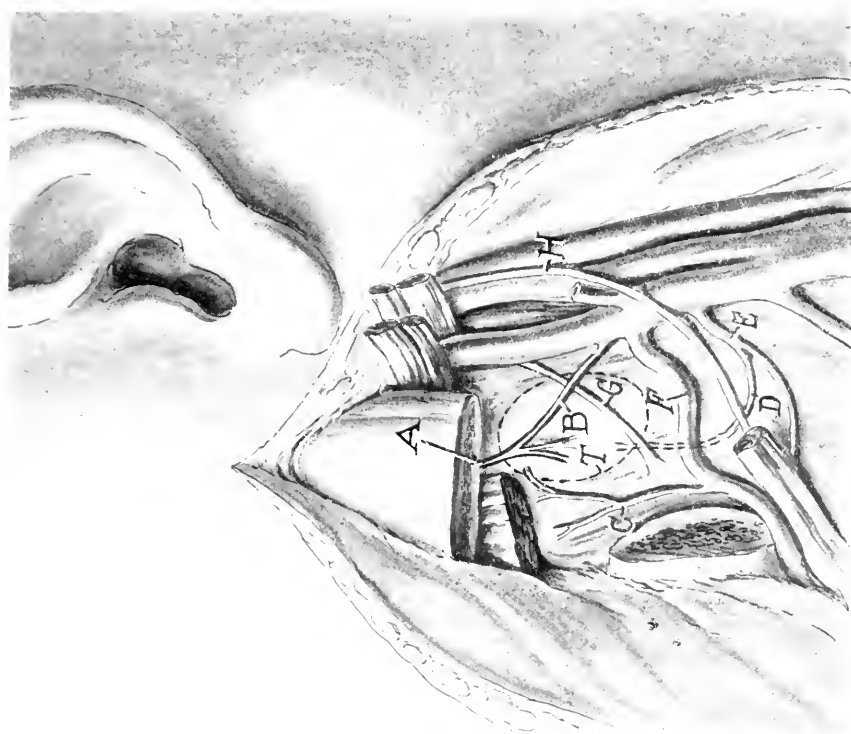


FIG. 1 (*Bullock*).—Dissection of the neck, showing blood supply of tonsil and close proximity of glossopharyngeal nerve to operated area. Anaesthesia of pharynx occasionally complained of is due to trauma to this nerve.  
A = Anastomosis, with desc. palatine. B = Ascending pharyngeal. C = Ascending palatine. D = Dorsalis linguae. E = Lingual. F = Facial. G = Glossopharyngeal N. H = Hypoglossal N. T = Tonsil.

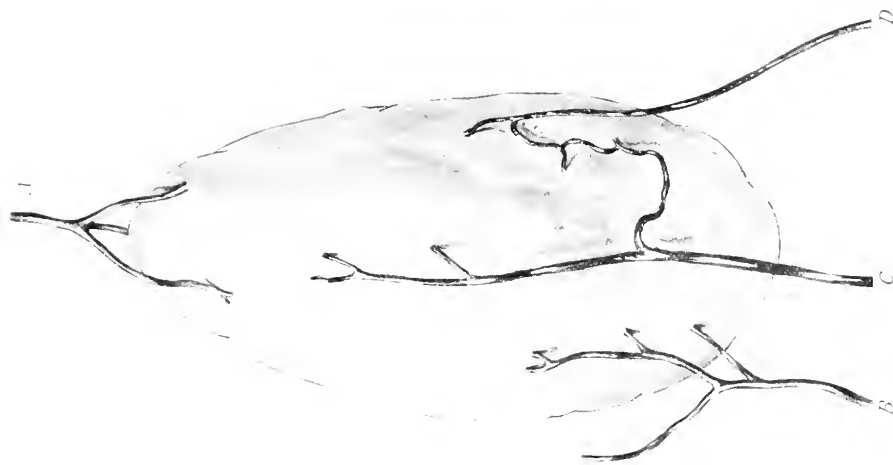


FIG. 2 (*Poynter*).—Outer surface of enucleated R. tonsil, showing average distribution of arteries and source of supply.  
A = Descending palatine artery. B = Ascending pharyngeal artery. C = Ascending palatine artery (tonsillar branch of facial artery). D = Dorsalis linguae artery.



# Hemorrhage during and after Tonsillectomy

From a study of the blood supply of the tonsil, it will be seen that there are no large arteries supplying the tonsil, nor with proper surgical technique is there any possibility of wounding any of the larger vessels of the neck, as the distance that these vessels are from the tonsils is well shown in Poynter's cross section of the head (F'ig. 3).

For a proper understanding of the question of tonsillar hemorrhage, the following classification is given:—

*First — Immediate or operative hemorrhage. Second — Recurring hemorrhage*, i.e., bleeding usually within twelve hours after the time of operation. *Third — Secondary hemorrhages*, which seldom occur before the fifth day, and may appear at any time up to the third week following operation, when the fossæ are completely healed.

*First — Operative Hemorrhage.* — Various procedures are resorted to by operators for controlling immediate or operative hemorrhage. It is a very common practice for many surgeons to disregard entirely the operative hemorrhage, and trust to luck that after a greater or less loss of blood the hemorrhage will stop. This practice is to be severely condemned, for while it is true that in most children and in some adults spontaneous cessation of bleeding does occur, it is only after an unnecessary amount of blood is lost.

Others resort to pressure within the tonsillar fossæ, keeping up the pressure for a few moments, replacing the gauze sponge with another, and so on for several minutes until the bleeding is stopped. This is a better procedure than the first, and while sufficient to control the hemorrhage in a very large percentage of cases, yet it is unreliable as a preventative of recurring hemorrhages. During the process of gagging and vomiting the thrombus may be dislodged and hemorrhage of considerable amount frequently ensues.

Others advocate suturing the anterior and posterior pillars together, but this procedure is difficult to perform accurately, and is apt to leave a dead space into which hemorrhage may recur. Some have resorted to placing a gauze plug in the fossa and stitching it to the pillars. Such a plug cannot be kept aseptic in the foul cavity of the mouth, and is a most unsurgical procedure. Others again have resorted to the use of the Mikulicz clamp, the large oval portion being placed in the

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tonsillar fossa, and the other part of the clamp on the inferior maxilla, the two being then screwed together to control the hemorrhage. This is also an unsurgical procedure, and of very doubtful efficacy for making pressure on the bleeding vessel.

The proper surgical treatment of hemorrhages from the tonsil should be the same as that used by surgeons in operating elsewhere in the body, namely—by seizing the bleeding points with suitable hemostats and ligating the vessels. The technical difficulty of passing a ligature round the hemostat in a tonsillar fossa, owing to the depth of the wound and the cramped working space, has led but few surgeons to adopt this procedure. There has been developed at Bellevue Hospital Ear, Nose, and Throat Service, a method of ligating the tonsillar vessels which is so simple and easy that were it generally known it would be more universally adopted. Before demonstrating the method, however, I wish to describe our entire surgical procedure in tonsillectomy.

If a general anæsthetic is administered the patient is placed in the recumbent position with the head resting level on the table. It is very necessary that excellent illumination of the parts be obtained, and, for this purpose, we find nothing as good as Mcintosh's headlight which may be attached to the street current. A Jennings's mouth gag is inserted, and the jaws widely opened; a tongue spatula is used to depress the tongue so as to obtain a full view of the tonsil from the supra-tonsillar fossa to its base. The grasping forceps are inserted into the tonsil, the upper member at the supra-tonsillar portion, the lower member near the lower pole. The forceps are closed and traction made upon the tonsil. A long-handled, slightly curved, sharp-pointed bistoury is employed to incise the mucous membrane, beginning posteriorly at the junction of the upper and middle third, and continuing over the supra-tonsillar portion and down the anterior third, care being taken not to pierce the capsule. A blunt, slightly curved scissors is then introduced along the line of incision, and with blunt dissection the tonsil is freed from its bed, first posteriorly then superiorly, and finally anteriorly over an area of half or more than half of the upper portion of the tonsil. A cold wire snare is passed over the forceps and down over the freed half of the tonsil. The wire loop is closed, the wire completing the dissection. During all of this procedure a metal tube from the

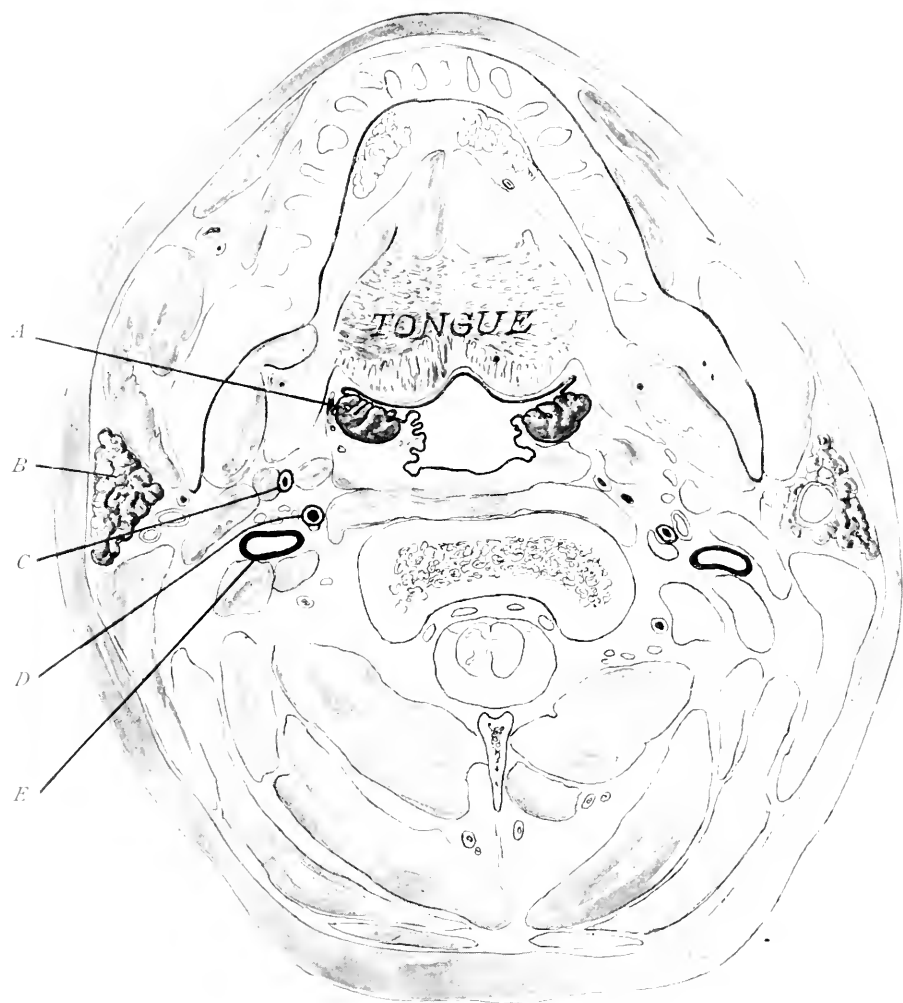


FIG. 3 (*Poynter*).—Cross section of head, showing relation of tonsils to the large vessels.

*A* = Tonsil.    *B* = Parotid gland.    *C* = External carotid.  
*D* = Internal carotid.    *E* = Jugular vein.





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suction apparatus is held in the pharynx, or temporarily employed along the line of incision, so that the operative field is at all times kept free from blood, and no blood allowed to pass into the hypo-pharynx or larynx.

Immediately after the tonsil is enucleated a gauze sponge of size sufficient to fill the fossa, held on a sponge holder, is placed in the tonsillar fossa, and by pressure temporarily controls the hemorrhage. At the end of a couple of minutes the capillary oozing has ceased, and on removing the sponge a few bleeding points will be noted. Each bleeding point is grasped with a hemostat. Surgeons always have their preference for the kind of hemostat to be used, but after experimenting with several, we find that the Allis hemostat with four mouse teeth is, in our hands, the most serviceable. As the ordinary Allis hemostat has a handle so short that the operator's hand obscures his view, we have had Messrs Tieman & Co. construct one, the length of which is 7 in. A straight hemostat is used for picking up vessels on the posterior wall of the tonsillar fossa, whereas we find a slightly curved hemostat more useful for seizing vessels in the supra-tonsillar fossa on its external wall, and at the bottom of the fossa adjacent to the tongue and lateral pharyngeal wall. In order to more accurately find these bleeding points, we employ the Hurd pillar retractor to lift upwards the margin of the wound in the supra-tonsillar region, and to displace externally the anterior pillar, while the tongue depressor is used to push the tongue downwards and mesially, so as to seize the very important bleeding points at the lower pole and on the lateral pharyngeal wall below the tonsil. If the bleeding is very active, it is necessary to use the suction tube *in the fossa* in order to keep it sufficiently free from blood to locate the bleeding points.

When all bleeding points have been secured we proceed to ligate the vessels. We have experimented with many kinds of ligature material such as catgut, twisted surgical silk, braided surgical silk, which is usually too coarse, and linen thread, but have found nothing equal to the small black silk braided fish-line, having a breaking strength of from 8 to 14 lbs. This material does not twist or break as do the others. A piece of braided silk about 14 in. long, sterilised by boiling, has a slip-knot tied in the middle of it, the loop being large enough to pass over the handle of the hemostat on the vessel

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(Fig. 4). The knot of the loop should be drawn sufficiently tight to let the free part slide with slight friction (Fig. 5). The non-slip part of the loop is grasped close up to

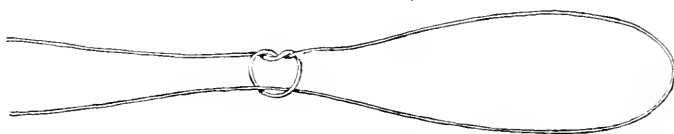


FIG. 4.

the knot with the end of a pair of slightly curved, long-handled forceps (Fig. 6). The grasping forceps should be serrated to prevent the ligature slipping in its jaws, but the serrations must not be sharp or they will be found to cut the

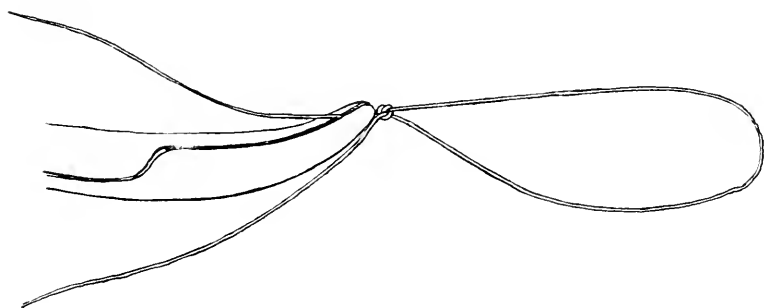


FIG. 5.

ligature when traction is made. The loop is placed over the hemostat, and carried down the shank and over the end of the hemostat, so as to engage the vessels. During this manipulation the loop is gradually lessened in size by pulling

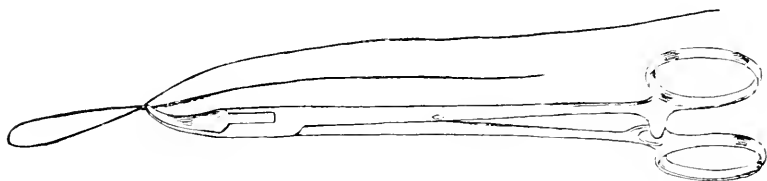


FIG. 6.

lightly upon the sliding part (Fig. 7, positions 1, 2, 3). The placing of the loop is done entirely with the forceps until such time as the loop is over the end of the hemostat, when the free end is drawn tight and the vessel ligated (Fig. 8).

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The hemostat and clamp are removed, and the two free ends of the ligature are picked up and cut off close to the knot; although this knot is the famous slip-knot, when pulled tightly it does not slip, and the ligatures may be found in the fossa from six to twelve days later. If several forceps are threaded with the slip-knot at the beginning of the operation, the

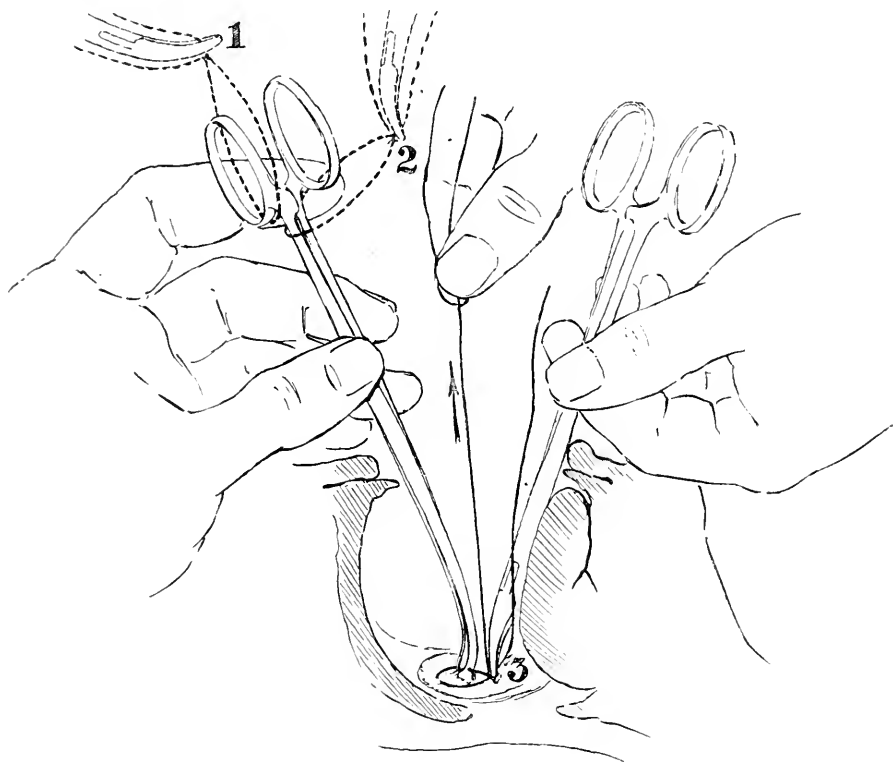


FIG. 7.

ligatures may be applied over the hemostat round the seized vessels as quickly, if not quicker, than a surgeon would ordinarily tie the vessels in an open wound. When the vessels are tied a small gauze sponge on a sponge holder is used to gently wipe the fossa, so that one may see that the operative field is absolutely dry, just as is done by surgeons in an open wound before sutures are introduced. The amount of blood lost in children by this method averages less than a dram per tonsil, while in adults it averages less than three

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drams per tonsil. The employment of styptics such as gallic acid, Monell's solution, etc., for the arrest of hemorrhage during or after a tonsil operation cannot be considered good surgical technic any more than they would be so regarded by the general surgeon.

We have noted two very different appearances of tonsillar fossæ at the completion of an enucleation—in one the tonsillar fossa is smooth, lined by the fascia separating the tonsil from the superior constrictor muscle. In such cases the bleeding points are easily seen and one not infrequently notices the unwounded plexus of veins underneath this smooth fascia (Fig. 9). In other cases the tonsillar fossa looks ragged, irregularly striated, and in such cases one usually finds a

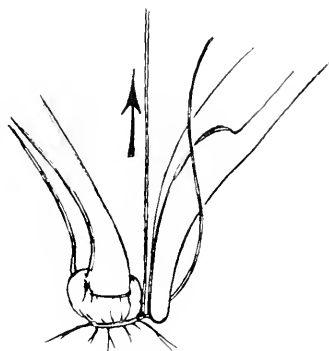


FIG. 8.

greater amount of hemorrhage owing to the wounding of the venous plexus (Fig. 10). One can liken the difference in these two fossæ to the difference between a pine board, one surface of which is planed, and the other remains roughened. It is much easier to see the bleeding points, and there are usually fewer vessels to ligate in the smooth glistening fossa than in those where the constrictor of the pharynx is exposed and a portion of the muscle amputated. The dissection in the latter condition opens the large plexus of veins that are extra capsular, and greater care is demanded in securing and ligating these to prevent recurring hemorrhage.

When the operation is completed the patient is put to bed, lying on the right side in Sims's position, with the head low. The nurse is instructed to carefully watch for bleeding. As little or no blood passes into the stomach during the

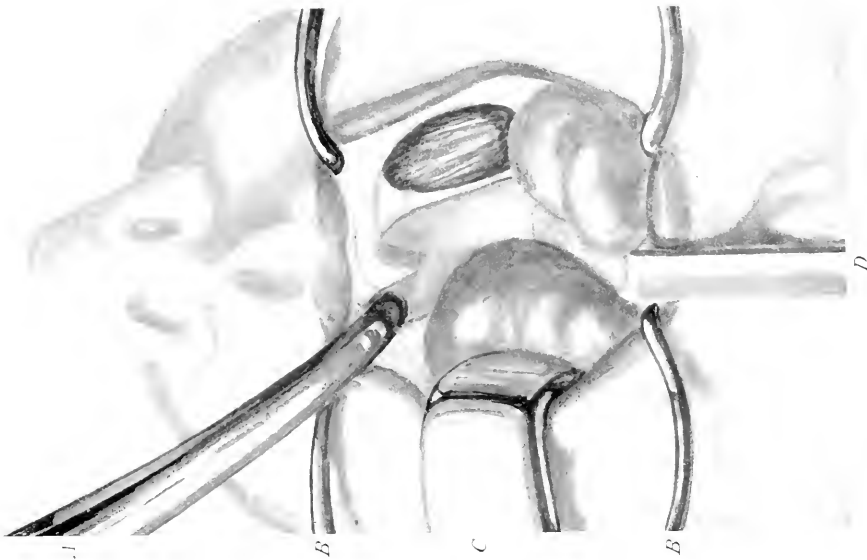


FIG. 10.—Illustrating rough Left Tonsillar Fossa with muscle striations exposed.  
A = Suction tube. B = Mouth gag. C = Ether tube. D = Tongue spatula.

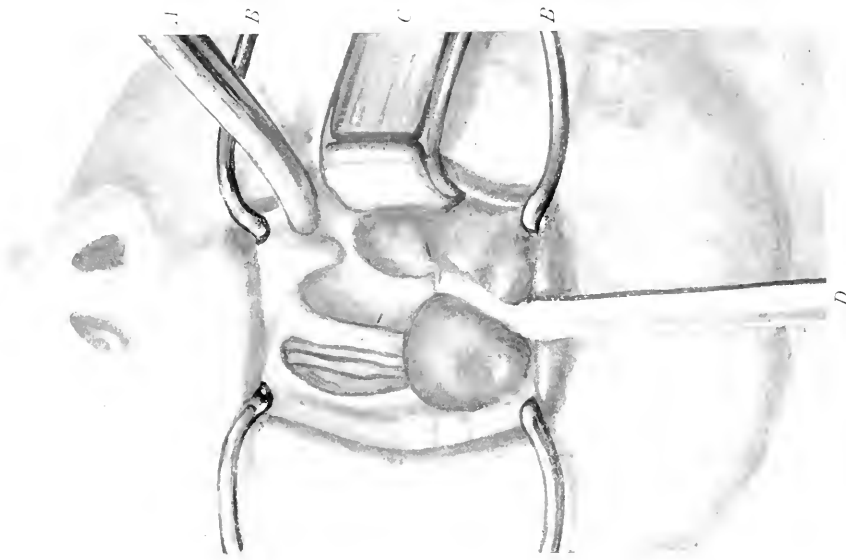


FIG. 9.—Smooth Right Tonsillar Fossa, showing plexus of veins in and beneath capsule.  
A = Suction tube. B = Mouth gag. C = Ether tube. D = Tongue spatula.



# Hemorrhage during and after Tonsillectomy

operation, and as all bleeding is controlled before the patient leaves the table, there is usually little or no blood in the vomitus. The nurse is instructed to report at once in case of any bleeding, and either I myself or one of my associates immediately proceed to the hospital to investigate the cause.

*Second—Recurring Hemorrhage.*—*Recurring hemorrhage is due entirely to bleeding coming from vessels not properly secured at the time of operation.* Formerly we were content with the crushing of some of the smaller vessels with a hemostat, but our experience has taught us that this is not a reliable process, and it is much safer to ligate than to crush even these small vessels. The tonsillar fossæ differ from the small areas elsewhere in the body operated upon in that they cannot be kept quiet. The action of the constrictor muscles and the tongue during gagging, vomiting, crying, and talking causes a re-opening of the cut ends of the vessels and hemorrhage occurs. There is great need, therefore, of the watchfulness of a trained attendant to report any evidence of recurring hemorrhage. It is our custom to visit the patient four or five hours after the operation and inspect the fossæ to see if they still remain dry and free from clot. An appearance of a black clot partially or completely filling a tonsillar fossa should be regarded as certain evidence that some vessel has given way and in all probability hemorrhage is still going on. Should such a condition be found we advocate the removal of the clot with a piece of gauze on a sponge holder, to locate the bleeding vessel, which should be seized with a hemostat, and a ligature applied as at the time of operation. If the recurring hemorrhage is severe, we have sometimes found it necessary to administer an anæsthetic in order to locate and ligate the offending vessel. Formerly it was our custom to remove the clot and sit alongside of the bed with a piece of gauze on a sponge holder in the fossa for half or three quarters of an hour. This will control the hemorrhage as long as pressure is maintained, but bleeding is so apt to recur soon after we leave the patient that we believe that pressure should only be resorted to in cases of very slight hemorrhage. Our experience has taught us that the nurse should be particularly on the watch, and warned to look for recurring hemorrhage in patients having cardiac or renal disease, or a high blood pressure, 160 mm. or over.

*Third—Secondary Hemorrhage.*—Secondary hemorrhage,

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that is hemorrhage coming on about the fifth day or later, is due to sloughing taking place in the fossa involving the thrombosed ends of the vessels. It is usually more difficult to grasp the bleeding vessels in these cases because of the brittleness of the tissue in the repaired area, and pressure has in most cases been sufficient to control the hemorrhage.

In conclusion we would urge the same surgical care of bleeding from vessels during and after tonsillectomy that is employed by surgeons operating on other parts of the body. The technical difficulty of applying ligatures in the tonsillar fossa is entirely overcome by the Bellevue method of applying ligatures. Recurring and secondary hemorrhages will occur in a certain percentage of cases, and only the vigilance of the nurse in attendance, and the proper attention on the part of the surgeon, are necessary in order to securely tie the bleeding vessel before any great amount of blood is lost. No one should perform a tonsillectomy unless he or some properly qualified person can be quickly made available to arrest the hemorrhage.



## THE PATHOLOGICAL AND CLINICAL ASPECTS OF DEAF-MUTISM.\*

By J. S. FRASER, M.B., F.R.C.S.Ed., Surgeon, Ear and Throat  
Department, Royal Infirmary, Edinburgh.

IN the issue of this Journal for January 1921, Kerr Love, in his article on Deaf-mutism, says, "The thing most wanted from the pathologist at present is a series of post-mortem examinations of undoubtedly deaf-born children." Although the writer can only claim to add two records to the list of microscopic examinations of the ears of deaf-mutes, and though only one of these was "congenital," the present would appear to be a suitable occasion on which to place before British otologists an account of the work which has been done on this subject. In spite of careful investigation it must be admitted that as yet the matter remains unsettled. The majority of observers have laid stress on the importance of changes in the ear itself, especially in the labyrinth. A minority have attributed the deafness to lesions in the brain. Reliable accounts, however, of changes in the hearing tracts and centres are almost non-existent, so that much work has still to be done before we can speak with any degree of confidence regarding the pathology of "central" deafness.

It is difficult to be exact with regard to the details of the various recorded cases. The writer finds in the literature that the same case is reported in several places. He cannot, therefore, lay claim to complete accuracy of description and can only plead that he has done his best to disentangle a very difficult subject.

There are three lines of research which undoubtedly throw considerable light on the question of congenital or "developmental" deaf-mutism—study of the comparative anatomy of the labyrinth, of the development of the inner ear, and of congenital deafness in animals. To go fully into these subjects is impossible in the present paper. They must therefore be left over for future consideration.

\* The histological work in connection with this paper was carried out in the Laboratory of the Royal College of Physicians, Edinburgh.

## J. S. Fraser

Before reviewing the literature of congenital deaf-mutism, the writer desires to record the following case:—

K. M'D., male, aged 13 years, was admitted to a Deaf and Dumb Institution at the age of 7 years, but had to be removed on account of frequent nocturnal enuresis. On re-admission after three years the incontinence was less troublesome. His parents stated that he had been born totally deaf, but his teacher in the oral class regarded him as having slight remains of hearing. The patient, however, could not repeat vowels spoken in the ordinary voice. As far as could be ascertained there were no other deaf members in the family. For several years the boy had suffered from foul-smelling otorrhœa (left). Two days before admission to the Royal Infirmary the patient complained of pain, and next day the school doctor noted mastoid tenderness. There were no rigors or vomiting.

*Examination* (18/9/10).—Temperature 102.5, pulse 88, respirations 20. Right drum-head indrawn; left meatus contained foul-smelling discharge. After syringing, granulations were seen to project from the posterior wall of the bony meatus at its inner end.

*Functional Examination: Cochlear Apparatus.*—Conversation voice not heard by either ear. The patient, however, nodded his head when the watch was applied to the mastoid process and auricle on each side, as if he heard something. C.32 and C.64 not heard by air conduction by either ear. C.128 apparently heard by right ear but not by left. C.256 was heard by both ears, and the tone of the fork correctly imitated by the boy. C.512 and C.1024 were also heard by both ears. C.2048 was not appreciated by either ear. *Vestibular Apparatus.*—No spontaneous nystagmus. Rotation tests not applied. Cold syringing of the right ear for ninety seconds produced distinct rotatory and lateral nystagmus to the left. Similar syringing of the left (discharging) ear produced slight nystagmus to the right in two minutes.

The case has already been recorded as a fatal intracranial complication of chronic middle-ear suppuration: death from purulent meningitis. (*Journal of Laryngology, Otology, and Rhinology*, vol. xxvii., 1912, p. 197, Case 98.) The post-mortem took place twelve hours after death.

### *Microscopical Examination of Left (Operated) Ear. Horizontal Sections from above downwards.*

*Tympanic Cavity.*—There is marked inflammatory change in the mucosa of the attic and great swelling of the submucosa, with small cell infiltration. Cholesteatoma and pus are present in the antrum.

There is erosion of bone on the inner wall of the antrum and on the prominence of the lateral canal. The crura of the stapes

## Pathological Aspects of Deaf-Mutism

are present, and the footplate is healthy, but the mucosa of the oval window niche is much swollen. The round window membrane is normal (Fig. 9).

*The bony labyrinth capsule* is normal except for the erosion mentioned above.

*Vestibule.*—The neuro-epithelium of the utricle is healthy, but the otolith membrane is separated (artefact), Fig. 2. The sacculus is collapsed (Fig. 8). The epithelium of the saccule appears to be well formed in parts. Colloid bodies are seen in the saccule. The duct from the utricle to the endolymphatic duct is wide, but that from the saccule is narrow. The ductus endolymphaticus is rather wider than normal, as it passes through the bone (Fig. 8). The vestibular nerve stains well by the Kulschitzky method.

*Cochlea.*—There is a considerable quantity of curdled lymph in the scala tympani in the inner aspect of the round window membrane, but the endolymph spaces are fairly free. The opening of the aqueduct of the cochlea appears slightly narrower than normal.

*Cochlear Canal.*—Reissner's membrane for the most part passes vertically upward, so that the cochlear canal is dilated (Figs. 3, 4, 5, and 6); Corti's organ is badly formed (Figs. 4, 5, and 6); nowhere is the normal acoustic papilla visible. It is best developed in the apical portion. The pillar cells, though deformed, can be made out in parts.

*Membrana Tectoria.*—The position of the membrana tectoria is nowhere normal. It is enclosed in epithelium. In the basal coil it is tucked into the inner spiral sulcus (Fig. 4); higher up it is elevated; in the upper part of the basal coil it is attached to the stria vascularis (Figs. 3 and 5); in the middle coil it is turned inwards towards the modiolus and helicotrema (Figs. 3 and 6); the *spiral ligament* shows clear areas—so-called “dropsical degeneration.” The *stria vascularis* does not present the normal appearance of a regular row of epithelial cells: at the apex of the cochlea it is almost absent (Fig. 3); the *cochlear nerve* itself is well formed, and the ganglion cells are present in apparently normal number: the cells appear somewhat shrunken, but have a well-marked nucleus.

*Canals.*—The cristæ of all the canals show slight desquamation of the epithelium and separation of the cupula—possibly associated with the high temperature before death (Fig. 1). As is commonly seen, there is irregular formation of the bony walls of the canals (Fig. 2). The crus commune is normal.

*Internal Meatus.*—There is meningitis within the arachnoid sheath of the nerves in the internal meatus (Fig. 7). The vestibular ganglion cells appear slightly shrunken (artefact?), but they are present in normal number.

## J. S. Fraser

*Saccus endolymphaticus*.—There is some hæmorrhage in the bony hollow which contains the saccus endolymphaticus. The bone here is roughened as if the extradural abscess had extended to this region.

### *Microscopical Examination of Right (non-operated) Ear.*

*The tympanic cavity*, ossicles and muscles are healthy, except for slight thickening of the mucosa and small cell exudation in the niche of the round window (Fig. 20).

*Labyrinth capsule* normal.

*Vestibule*.—The sacculus is collapsed (Fig. 19). The ductus reuniens is obliterated, and cannot be traced between the collapsed sacculus on the one hand and the intra-vestibular part of the cochlea on the other. The utriculus is normal (Fig. 20). The ductus endolymphaticus is much shorter than usual.

*Cochlea*.—The cochlear opening of the perilymphatic aqueduct is healthy (Fig. 19), but towards the cranial end the duct contains a few leucocytes. These are also seen in the scala tympani in the upper surface of the round window membrane. The *cochlear duct* is narrow and collapsed (Figs. 10, 11, 15, and 16). Reissner's membrane is bent downwards, and is adherent to the overgrown stria vascularis for at least half its extent. In the apical coil the scala media is quite filled up, and is adherent to the bony partition between the apical and middle coils (Fig. 10). *Corti's organ* is for the most part an irregular heap of cells. The *membrana tectoria* is adherent to Corti's organ, and also to the stria vascularis. In places it is tucked into the internal spiral sulcus (Figs. 12 and 13). The *spiral ligament* shows areas of degeneration (Fig. 13). The *spiral ganglion* cells appear normal in number (Fig. 17), and the hollow space of the bony spiral lamina is well filled with nerve fibres (Figs. 14 and 15). The *cochlear nerve* in the modiolus is quite normal.

*Canals* are healthy.

*Internal Meatus*.—There are many pus cells and some blood in the fundus of the internal meatus between the arachnoid and dura mater (basal meningitis) (Fig. 18). The cochlear nerve in the internal meatus shows quite the normal thickness, but there is some meningitic infiltration round and between the nerve bundles (Fig. 11). The vestibular ganglion cells are not diminished.

*The saccus endolymphaticus* is healthy.

**Remarks.**—The case is one of "congenital or developmental" deafness belonging to the Scheibe type, with slight remains of hearing and a normal or almost normal vestibular reaction. It is of interest that on the right side the cochlear canal is

# Pathological Aspects of Deaf-Mutism

collapsed, especially at the apex, while on the left side it is dilated. This condition, however, has been noted by previous observers.

## CLASSIFICATION OF DEAF-MUTISM.

Cases of deaf-mutism are usually divided into (I.) Congenital, and (II.) Acquired. At first sight this classification appears simple and convenient, but it is not scientifically accurate. Congenital deafness has usually been held to include not only "developmental" cases due to faults of the germ plasm, but also those due to such inflammatory conditions as intra-uterine meningitis. In other words, "congenital" has been regarded as synonymous with "before birth." Cases due to congenital syphilis are difficult to classify; they do not, as a rule, become deaf till childhood is well advanced, or even later. On the other hand cases in which there is a more or less gradual atrophy of Corti's organ and of the eighth nerve, as described by Politzer, are undoubtedly due to inherited weakness, though the clinical condition may only manifest itself some time after birth. It therefore appears to be more scientific to divide cases of deaf-mutism into those due to an error in development and those due to inflammatory conditions.

Unfortunately the boundary line between (I.) Congenital (developmental) deaf-mutism, and (II.) Acquired (inflammatory) deaf-mutism can not always be sharply demarcated. We know from experience that cases which are difficult to diagnose clinically also present difficulties to the pathologist and microscopist. For example, the presence of connective tissue in the perilymph space is usually held to indicate a past inflammatory condition. Alexander, however, points out that connective tissue normally present in the perilymph space of the embryo may not disappear, as it should, but may persist into extra-uterine life.

Siebenmann subdivides (I.) Congenital cases into (1) those with aplasia of the whole labyrinth, and (2) those in which the neuro-epithelium of certain parts of the endolymphatic space is more or less degenerated. The latter group (2) is further subdivided into (*a*) those in which the metaplasia is confined to the basilar membrane, and (*b*) those with extensive metaplasia or absence of sensory epithelium, associated with dilatation or collapse of the pars inferior (Scheibe's type). (II.) In cases of acquired deaf-mutism Siebenmann distinguishes (1)

## J. S. Fraser

those of meningitic origin; (2) those of tympanic origin; and (3) those with primary changes in the labyrinth, *i.e.*, cases due to mumps, trauma, acquired syphilis. Politzer classifies cases of acquired deaf-mutism on a clinical basis into those due to (1) epidemic meningitis, primary meningitis, and hydrocephalus; (2) otitis media from infectious diseases; (3) syphilis; (4) mumps and primary infection of the labyrinth; (5) injuries of the labyrinth.

Denker on the whole agrees with Siebenmann's classification, but subdivides congenital cases into (1) those due to intra-uterine inflammatory processes, including syphilitic cases; and (2) those due to maldevelopment of non-inflammatory origin. The latter group is further subdivided into (*a*) hereditary cretinoid degeneration (endemic deaf-mutism), and (*b*) hereditary degenerative (sporadic) deaf-mutism.

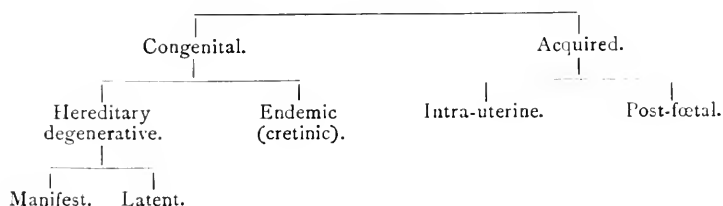
Hammerschlag points out that it may be difficult or impossible to say whether a labyrinthine affection occurred during intra-uterine or during the first year of extra-uterine life. He therefore divides deaf-mutism into two groups:—(I.) Constitutional deaf-mutism, and (II.) Deaf-mutism due to local disease of the ear, *e.g.*, trauma or inflammation. (I.) Constitutional deaf-mutism is only part of a general constitutional anomaly and may be congenital or acquired. It is subdivided into—(1) An endemic or cretinoid form due to the same poison responsible for endemic cretinism; (2) sporadic or hereditary degenerative deaf-mutism. Constitutional affections, according to Hammerschlag, show three characteristics. Firstly, they are hereditary, either directly or indirectly; secondly, they occur more than once in the same generation; and thirdly, they are associated with other hereditary degenerative conditions. In constitutional deaf-mutism, for example, we find, if we go thoroughly into the matter, a family history of deafness, or at least of deficient hearing, in several members of the family, and, in addition, other stigmata of degeneration, such as albinism, retinitis pigmentosa, squint, etc. (II.) Deaf-mutism due to local disease of the organ of hearing is always acquired, whether in foetal or post-foetal life.

Urbantschitsch also divided deaf-mutism into—(I.) Congenital, and (II.) Acquired. (I.) Congenital deaf-mutism includes (1) Cases of hereditary degenerative character due to a fault in the germinal layers. In some of these the disposition is latent and only becomes manifest when some other cause arises. In most

# Pathological Aspects of Deaf-Mutism

cases, however, the disposition is apparent from the beginning. (2) Endemic or cretinoid deafness. (II.) Acquired cases, according to Urbantschitsch, may be either (1) Intra-uterine (including cases resulting from congenital syphilis), or (2) Post-fœtal.

## *Urbantschitsch's Classification of Deaf-mutism.*



Goerke has put forward another classification into two groups—(I.) Embryonic, and (II.) Post-embryonic. In the embryonic category Goerke includes cases in which the ear is affected during its development, while all the remaining forms belong to the second group. Here again we meet with the difficulty that it may be almost impossible to say, even on microscopic examination, whether a given case is of embryonic or post-embryonic origin. Only cases of aplasia of the temporal bone can with certainty be regarded as embryonic, because recent investigations are said to show that malformation of a hypoplastic kind may be caused by intra-uterine inflammation. Even the labyrinth anomalies of the anencephalic fœtus may be of an inflammatory nature because the brain change itself may be due to inflammation.

Alexander states that in most cases of congenital deaf-mutism there was originally a defective embryonic rudiment of the nerve ganglia and of Corti's organ (Scheibe's type). In a smaller number of cases, on the other hand, the embryonic rudiments were normal, but, owing to faulty development of the tympanic cavity and capsule of the labyrinth, there resulted secondary atrophy of the ganglia and degeneration of Corti's organ (Siebenmann's and Mondini's types).

Brouwer classifies deaf-mutes into (I.) those with inflammatory changes in the labyrinth—acquired cases; (II.) those with destruction of the temporal lobes; (III.) those with changes in the inner ear but no sign of inflammation. Brouwer thinks that the degeneration of the peripheral hearing organ in this third group is the result of disease of the medulla oblongata, possibly resulting from internal hydrocephalus.

After considering carefully the various views as to the classification of deaf-mutism put forward by different observers, the writer has come to the conclusion that it is best to adopt Hammerschlag's view and divide cases of deaf-mutism into (I.) those apparently due to errors in development; and (II.) those due to inflammatory conditions or traumatism. The writer does not believe that sporadic congenital deaf-mutism is due to intra-uterine meningitis, firstly, because the membranous labyrinth is developed from the epiblast and only later becomes connected to the central nervous system by means of the acoustic ganglia and eighth nerve; secondly, because it is difficult or impossible to think of foetal meningitis affecting only the sacculæ and cochlea and leaving intact the remaining parts of the membranous labyrinth, especially as in many cases the cochlear nerve and ganglion appear to be normally developed; and, thirdly, because the changes observed in congenital deafness differ so markedly from those produced in the inner ear in cases of meningitic labyrinthitis in post-foetal life.

With regard to the relative frequency of congenital as compared with acquired cases of deaf-mutism, the original view was that the former greatly out-numbered the latter. More recently, in the light of our increasing knowledge of labyrinthitis, the original view was reversed and the conclusion reached that, at any rate in countries in which endemic cretinism and deaf-mutism are rare, the acquired cases out-numbered the congenital. We must remember, however, the great difficulty of making a diagnosis between congenital and acquired cases in the living subject, when we have only the history—often inaccurate—and the clinical examination of the case to guide us. Even microscopic examination of the labyrinth in some cases of deaf-mutism does not always provide us with an absolutely clear picture of the cause of deafness, but, in the great majority of cases, there can be little doubt in classifying a given case as either “congenital or developmental” on the one hand, as opposed to “acquired or inflammatory” on the other. If, then, we take it that the labyrinths of deaf-mutes who have come to autopsy, have been impartially examined, we must conclude that the congenital cases out-numbered the acquired ones. This conclusion is confirmed by an analysis of the clinical examinations of a series of cases of deaf-mutism carried out by the writer to be published in the second part of this paper.



# Pathological Aspects of Deaf-Mutism

## I.—CONGENITAL OR DEVELOPMENTAL DEAF-MUTISM (CONSTITUTIONAL DEAF-MUTISM OF HAMMERSCHLAG).

### (A.) **Endemic or Cretinic Deafness.** (Siebenmann's Type.)

**Clinical Aspect.**—Patients may be mentally feeble and, in later life, demented, or they may be congenital idiots. A few are mentally bright. Most of the cases were complete cretins. Goitre may be present in the patients and other members of the family. The majority of the patients are deaf from birth, but one case of Mannasse's, though dumb, only became deaf at 14 years. Some of Nager's cases showed sound-conduction deafness and had remains of hearing about the middle of the scale. Siebenmann states that many endemic deaf-mutes can perceive tones over the whole eleven octaves though the hearing is greatly diminished. Habermann has examined clinically 12 cases of cretinism and always found diminution of hearing. Stein states that 25 per cent. of cretins have normal hearing, 45 per cent. slight deafness, 25 per cent. severe deafness, and 5 per cent. absolute deafness. As a rule the disturbance of hearing is parallel with that of the bodily and intellectual development, but it may be the only symptom of cretinoid degeneration. Mannasse believes that a degenerative family disease is present, including struma, cretinism, and congenital deafness. Nager mentions the broad-based, waddling gait of his patients. He attributes this to changes in the brain.

### **Anatomical Changes :—**

(1) *External Ear.*—In one of Nager's cases the lobule of the left ear was slit and there was also a pre-auricular cartilage.

(2) *Middle Ear.*—The changes here are important and have been described by Siebenmann, Politzer, Habermann, Nager, Mannasse, Alexander, Moos and Steinbrügge, Mayer, Oppikofer, Denker, Schlittler and Brock. Alexander mentions myxomatous thickening of the submucous tissues of the middle ear. In the great majority, if not in all cases, there was filling up of the window niches by connective tissue and fat cells. Nager believes that this is due to the transformation of myxomatous tissue. In many, the long process of the incus and the head or posterior limb of the stapes were adherent to the facial canal by connective tissue or bone, and in some the incus was ankylosed by bone to the aditus or to the tegmen tympani. Several writers mention thickening of the footplate of the stapes or bony ankylosis to

the margin of the oval window. The crura may be joined together. Siebenmann mentions absence of the stapedius tendon. The sinus tympani may be absent. Exostoses are frequently found on the promontory, and there may be osteoporosis of the whole promontory wall. Alexander and Nager have noted areas of otosclerosis in cases of cretinic deafness. General bony narrowing of the tympanic cavity has been described—indeed the tympanum may be obliterated by new-formed, spongy bone. Even the antrum may be filled up and the mastoid abnormally small. Habermann and Nager found inflammatory changes in the middle ear in several cases. These may have been accidental, but, on the other hand, it is possible that the middle ear changes characteristic of cretinic deafness may be the results of otitis media.

(3) *The Labyrinth Capsule* is often thick and sclerotic. (In this connection Nager points out the embryological relationship between the stapes footplate and the labyrinth capsule, but admits that it is the outer or periosteal layer of the capsule that is mainly affected and the tympanic surface of the footplate that is thickened. Nager agrees that these changes may be associated with otitis media.) Endostoses have been reported growing from the labyrinth capsule into the hollow spaces of the cochlea, vestibule, and canals. The affection of the labyrinth capsule may produce deformity of the cochlear scalæ, which are angular on section rather than oval or circular. Siebenmann and Nager mention that the bony walls between the various coils of the cochlea may be very thin and in parts only membranous.

(4) *Inner Ear*.—Habermann, Schlittler, and many others have found the inner ear *normal*; indeed, few writers have reported any gross abnormality, though some mention such conditions as slight swelling of the membrana tectoria and atrophy of the spiral ligament. In one of Nager's cases the cochlear duct was dilated in the lower and collapsed in the upper part. Mannasse states that in his case Corti's organ was replaced by cubical epithelium, while the cristæ and maculæ were atrophic. He notes, however, that the changes seen are really those of chronic progressive labyrinthine deafness. In Siebenmann's case the acoustic papilla was very low and Reissner's membrane depressed. In a human cretin Alexander found marked degenerative changes in Corti's organ but only slight changes in the nerve and ganglia, while in a deaf cretinic dog he noted partial obliteration of the cochlear canal. Corti's organ was absent in places, and, through-

# Pathological Aspects of Deaf-Mutism

out, the hair and pillar cells were not to be seen. Further, Alexander noted a poor vascular supply to the labyrinth in one case, similar to that observed in albinotic congenitally deaf animals. Some observers have noted that the spiral ganglion cells were reduced in number in the basal coil, and that there was an increase of connective tissue around them. The fine nerve fibres in the modiolus and bony spiral lamina may be very thin. In one case Nager found a small tumour (neurofibroma) on a branch of the cochlear nerve in the modiolus. In Siebenmann's case the cochlear nerve itself was very thin.

(5) *Brain*.—In one of Nager's cases the dura was thickened and adherent to the skull. Brain changes were also present. Alexander, on the other hand, found no change in the acoustic nuclei, in the central paths, or in the temporo-sphenoidal lobe.

**Summary.**—On the whole, then, we may say that in endemic or cretinic deafness there are marked changes in the middle ear and labyrinth capsule, including the window niches, whereas the inner ear in the majority of cases shows practically normal conditions. This is in marked contrast to the conditions found in sporadic congenital deafness, in which the membranous labyrinth and eighth nerve are at fault. Nager states that tuning-fork tests show that many cretinic deaf-mutes are really only "hard of hearing." This degree of deafness, however, in conjunction with the feeble mental development results in deaf-mutism.

## *Views as to Pathology of Endemic Deaf-mutism.*

*A Developmental Anomaly.*—Mannasse, Mayer, Hammer-schlag, Stein, and Goerke believe that the changes are developmental and are caused by a congenital constitutional anomaly. Siebenmann believes that they occur between the fourth and sixth months of foetal life. Goerke calls attention to the presence in these cases of other similar anomalies, secondly, to the absence of any sharp line of demarcation between normal and pathological bone, and thirdly, to the persistence of embryonic tissue in various parts of the middle and inner ear. Mannasse thinks that the labyrinthine changes result from a slow atrophic degenerative process which may begin in intra-uterine life. Hardness of hearing is produced by changes in the middle ear, especially in the window niches, but complete deafness comes on when labyrinth atrophy occurs. Stein points out the

similarity of the changes observed in some cases of cretinic deafness to those seen in Scheibe's type of sporadic congenital deafness. Stein holds that the changes in the inner ear and eighth nerve are developmental, but looks on the middle ear changes as post-embryonic and due to the failure of the normal resorption. On the whole, Stein groups endemic deaf-mutism along with sporadic congenital deaf-mutism (Hammerschlag's hereditary degenerative deafness), and includes them both under the heading of "constitutional" deafness.

*Deafness due to Brain Changes.*—Bircher, Kocher, Scholz, and Schlittler hold that the changes are in the brain. (Alexander, however, found the brain apparently free from disease.) Schlittler calls attention to the remarkable conjunction in these cases of deaf-mutism with a normal inner ear, but thinks that the changes in the sensory epithelium may be too delicate for observation by our present methods. Siebenmann and Nager take the view that in many cases the deafness is the result of changes in the brain due to intra-uterine meningitis. Nager believes that the tympanic changes are caused by faulty resorption of foetal connective tissue, and further suggests that the changes in the labyrinth capsule may be due to rickets. Denker holds that the deafness is due to disturbance of the central nervous system resulting from disorders of metabolism owing to loss of thyroid secretion, because in dogs whose thyroids had been removed there was no reaction to sound, and yet the middle and inner ears, along with the central paths, showed no degenerative or other changes.

Nager believes that in the later period of intra-uterine life the "goitre poison" influences the whole of foetal development, including the thyroid glands. This leads to disturbed ossification and dwarfism, as well as to the brain changes causing imbecility or idiocy. Siebenmann holds that the deafness cannot be explained by the absence of thyroid secretion, because in a case of total aplasia of the thyroid gland in a case of athyreosis with dwarfism, aged 13 years, he found the inner ears normal. This shows that the thyroid gland is not necessary for the development of the membranous labyrinth during intra-uterine life. Siebenmann and Nager believe that the causes of cretinism and cretinoid deafness are not want, in-breeding, and other social conditions, but rest on a geological basis. It has been said that in Europe mutism diminishes from the Alps towards the sea.



FIG. 1.

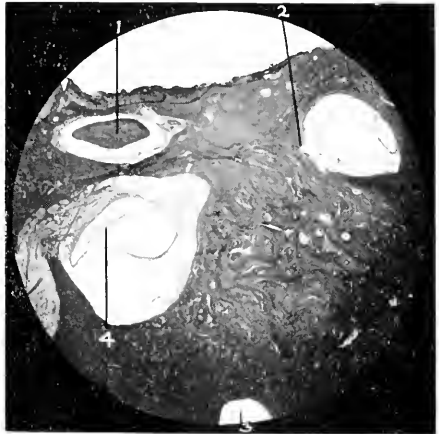


FIG. 2.

FIG. 1.—Case I. K. M'D., male, aged 13 years, Congenital Deaf-Mute. Section No. 165. Horizontal section through left ear.  $\times 13$  diam. Shows normal condition of crista of lateral canal.

FIG. 2.—Case I. Horizontal section of left ear. No. 210.  $\times 6$  diam. 1. Facial nerve. 2. Irregularity of bony wall of lateral canal—a common appearance. 3. Smooth end of superior canal. 4. Separated otolith membrane of utricle (artefact?). The neuro-epithelium is normal.

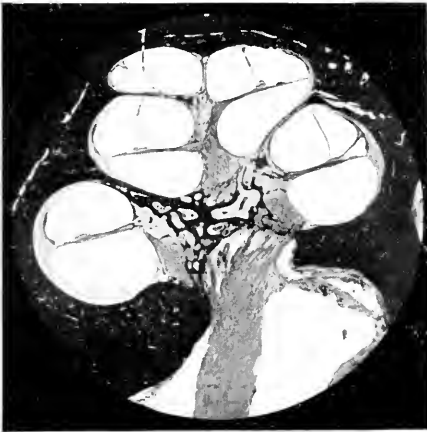


FIG. 3.

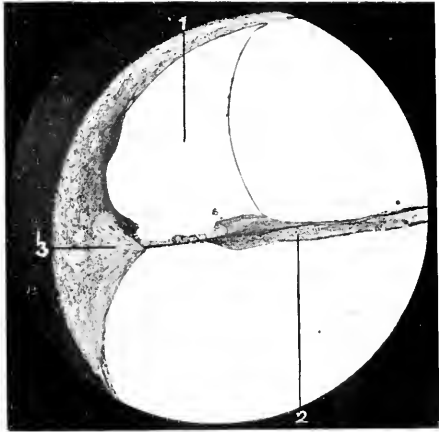


FIG. 4.

FIG. 3.—Case I. Horizontal section through left ear. No. 250.  $\times 11$  diam. Axial section through cochlea. Shows dilatation of cochlear duct in all coils. The cochlear nerve and spiral ganglion appear normal. 1. Reissner's membrane is ruptured at the apex of the cochlea (artefact?), and here the basilar membrane lies on the bony lamella which separates the upper part of the middle coil from the apical coil. The helicotrema is absent.

FIG. 4.—Case I. Horizontal section through lower part of left basal coil. No. 250.  $\times 45$  diam. Note that the membrana tectoria is tucked into the internal spiral sulcus. Corti's organ is rudimentary, but the inner pillar cell can be made out. 1. Dilated cochlear duct. 2. Nerve in bony spiral lamina, apparently normal. 3. Spiral ligament which shows the so-called dropsical degeneration.

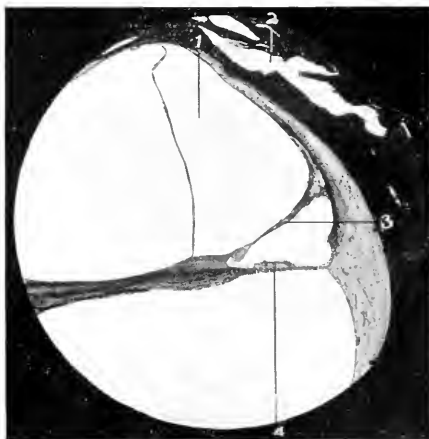


FIG. 5.

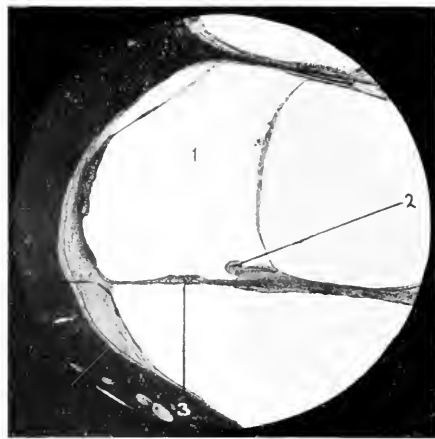


FIG. 6.

FIG. 5.—Case I. Horizontal section through upper part of left basal coil. No. 250.  $\times 45$  diam. 1. Dilated cochlear duct. 2. Split in the bony capsule (artefact). 3. Adhesion between membrana tectoria and stria vascularis. 4. Rudimentary Corti's organ.

FIG. 6.—Case I. Horizontal section through lower part of left middle coil. No. 250.  $\times 45$  diam. 1. Dilated cochlear duct. 2. Membrana tectoria lying on the apex of the limbus. 3. Rudimentary Corti's organ. 4. Spiral ligament showing droptical degeneration. The stria vascularis appears to be well formed.

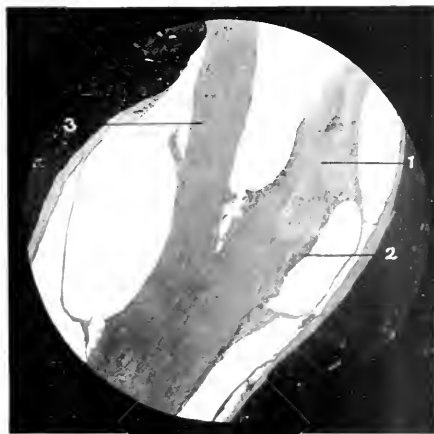


FIG. 7.

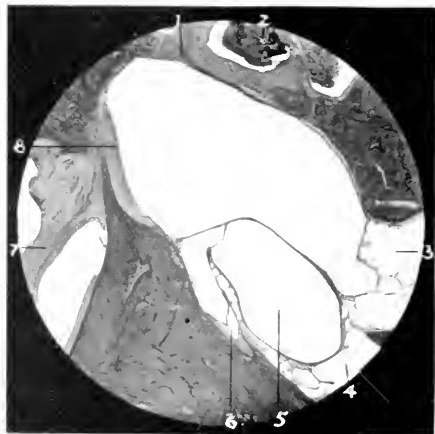


FIG. 8.

FIG. 7.—Case I. Horizontal section through cochlear and vestibular nerves in left internal meatus. No. 250.  $\times 11$  diam. 1. Vestibular ganglion. 2. Meningeal infiltration. 3. Cochlear nerve which is well formed.

FIG. 8.—Case I. Horizontal section through left ear. No. 290.  $\times 11$  diam. 1. Footplate of stapes. 2. Purulent exudate in hollow of stapes. 3. Opening of smooth end of lateral canal into vestibule. 4. Crus commune. 5. Utricle. 6. Ductus perilymphaticus. 7. Nerve to saccule surrounded by meningitis. 8. Collapsed saccule.

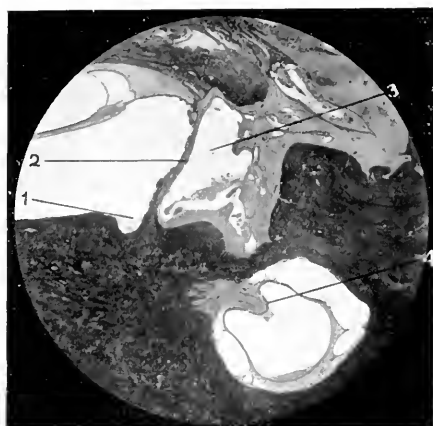


FIG. 9.

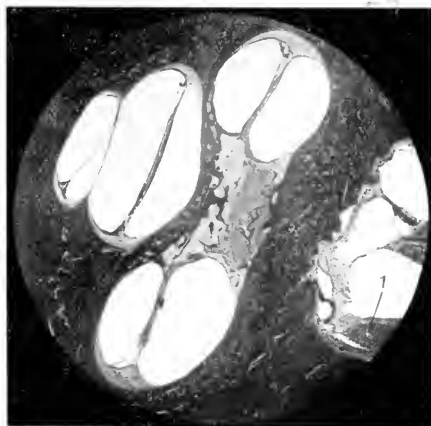


FIG. 10.

FIG. 9.—Case I. Horizontal section through left ear. No. 386.  $\times 11$  diam. 1. Cochlear opening of perilymphatic aqueduct, containing a few pus cells. 2. Round window membrane with pus cells on its upper or labyrinthine aspect. 3. Niche of round window. 4. Crista of posterior canal, normal.

FIG. 10.—Case I. Vertical section through right ear. No. 1.  $\times 10$  diam. On this side the cochlear duct is collapsed in all coils. 1. Meningitic infiltration in fundus of internal auditory meatus. Note curious appearance of membranous cochlea of apical coil. The membranous canal is collapsed and attached to the bony partition between the apical and middle coils.

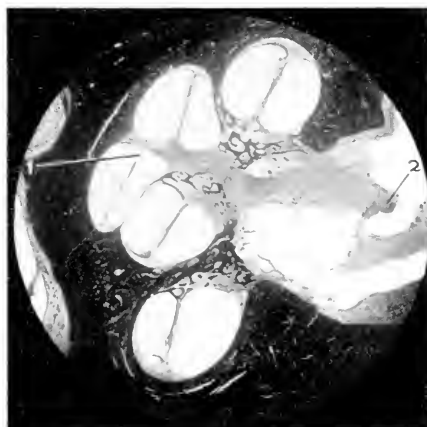


FIG. 11.

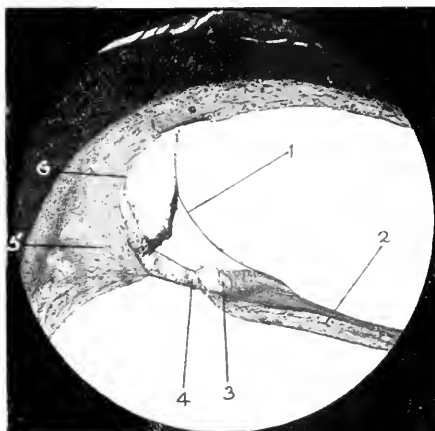


FIG. 12.

FIG. 11.—Case I. Vertical section through right ear. No. 55. Axial section through cochlea.  $\times 8$  diam. Cochlear nerve and ganglion are normal. 1. Helicotrema. 2. Meningitic infiltration in internal meatus.

FIG. 12.—Case I. Vertical section through lower part of right basal coil. No. 55.  $\times 50$  diam. 1. Reissner's membrane depressed and attached to region of spiral prominence by band of connective tissue. 2. Nerve in bony spiral lamina, normal. 3. Membrana tectoria tucked into internal spiral sulcus. 4. Tunnel of Corti. The sensory cells and the other supporting cells are absent. 5. Dropsical degeneration and spiral ligament. 6. The stria vascularis is misplaced.

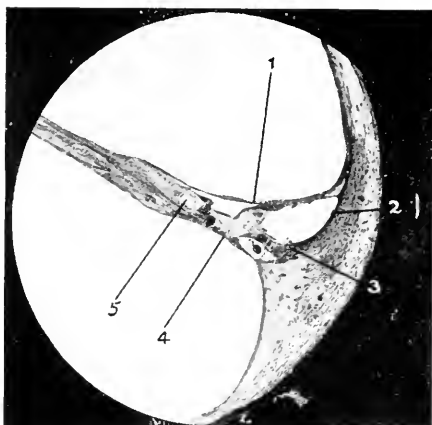


FIG. 13.

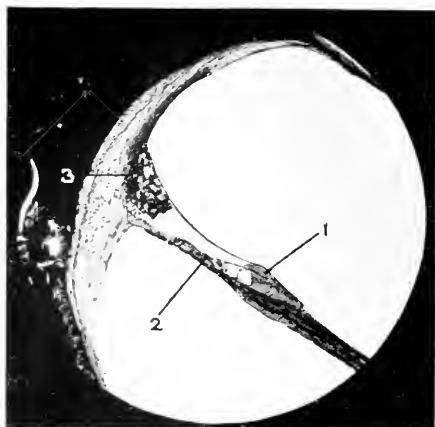


FIG. 14.

FIG. 13.—Case I. Vertical section through upper part of right basal coil. No. 55.  $\times 50$  diam. 1. Reissner's membrane depressed and attached to basilar membrane. 2. Position of stria vascularis, which is absent. 3. Position of spiral prominence. 4. Basilar membrane. 5. Membrana tectoria tucked into internal spiral sulcus. It will be seen that there is a complete malformation of the epithelium lining the cochlear canal, which is represented by at least four spaces in the section.

FIG. 14.—Case I. Vertical section through lower part of right middle coil. No. 55.  $\times 50$  diam. 1. Membrana tectoria, which lies between the origin of Reissner's membrane and the limbus. 2. Rudimentary Corti's organ. 3. Great proliferation of stria vascularis, which occupies the outer third of the narrow cochlear canal.

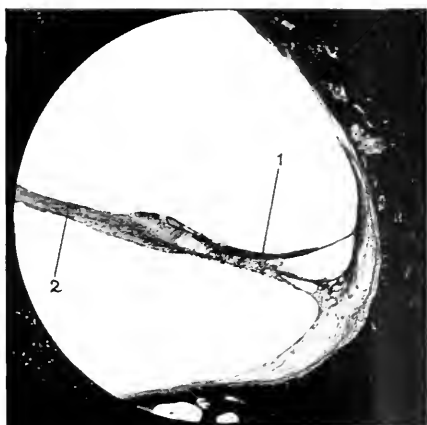


FIG. 15.



FIG. 16.

FIG. 15.—Case I. Vertical section through upper part of right middle coil. No. 55.  $\times 50$  diam. 1. Reissner's membrane adherent to basilar membrane. 2. The nerve in the bony spiral lamina is normal.

FIG. 16.—Case I. Vertical section through right ear. No. 55.  $\times 50$  diam. 1. Upper blind end of cochlear duct, showing complete collapse.





FIG. 17.

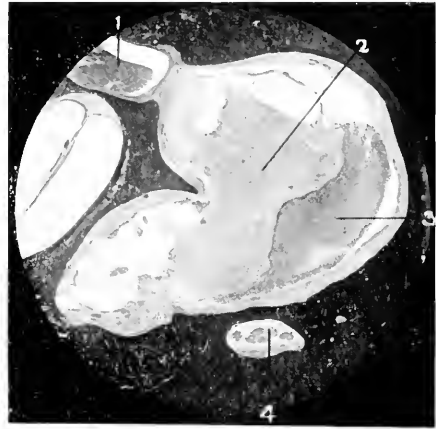


FIG. 18.

FIG. 17.—Case I. Vertical section through right ear.  $\times 28$  diam. Section No 70 stained by Kulschitsky-Pal method to show condition of cochlear nerve and ganglion cells. Note that these stain normally. Shows the internal meatus and part of the modiolus.

FIG. 18.—Case I. Vertical section of right ear. No. 150.  $\times 9$  diam. Shows internal meatus with vestibular ganglion. 1. Facial nerve. 2. Vestibular ganglion. 3. Meningitic infiltration between dura and arachnoid. 4. Nerve to ampulla of posterior canal.

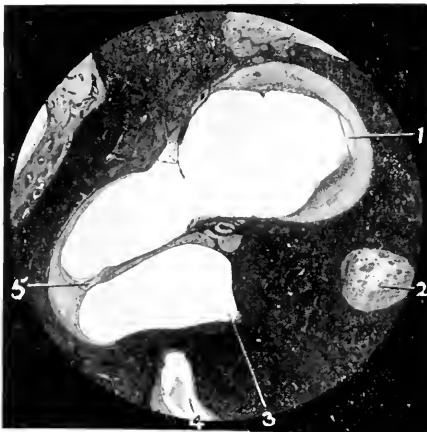


FIG. 19.

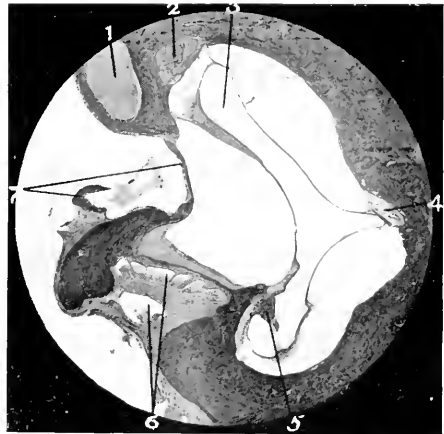


FIG. 20.

FIG. 19.—Case I. Vertical section of right ear. No. 226.  $\times 13$  diam. 1. Collapsed saccule. 2. Nerve to ampulla of posterior canal. 3. Opening of aqueduct of cochlea. 4. Niche of round window. 5. Cochlear duct.

FIG. 20.—Case I. Vertical section through right ear. No. 315.  $\times 8$  diam. 1. Facial nerve. 2. Vestibular nerve. 3. Utricle (neuro-epithelium normal). 4. Endolymphatic duct. 5. Crista of posterior canal, normal. 6. Niche of round window, and, above this, the blind vestibular end of the cochlear duct. 7. Stapes. The head is lightly attached to promontory.



# Pathological Aspects of Deaf-Mutism

## (B) Sporadic Congenital Deafness.

### (1) *Aplasia of the Whole Labyrinth. (Michel's Type.)*

Only one case of this kind has hitherto been recorded—that by Michel. In this there was a double defect of both labyrinths and eighth nerves, while the external meatus and tympanic membranes were normal. The tympanic cavity, however, was narrow, and there was only a hint of the mastoid antrum. Indeed the mastoid process is described as being absent. Siebenmann explains this condition by postulating absence of the otic vesicle in the first month of foetal life. Schwartze has examined the head of a new-born child with premature synostosis of the skull. The petrous pyramid was very thin and showed no trace of the semicircular canals or other parts of the labyrinth. The middle ear was well developed. The case strongly resembles Michel's. Siebenmann states that Virchow and Marfan-Armand-Delille have recorded cases of complete absence of the pyramid. The tympanic cavity, facial canal, labyrinth and nerves were also absent. Ogston has published the case of a child one year old, who suffered from congenital atresia of the external auditory meatus on one side. A macroscopic examination showed atrophy of the eighth nerve, hemiatrophy of the cerebrum and cerebellum, hypoplasia of the pyramid, and absence of the third, tenth, and eleventh nerves.

Siebenmann thinks that congenital atresia of the external meatus is not infrequently combined with malformation of the middle and inner ear. He has collected ten cases of bilateral congenital atresia and three of unilateral affection. Clinically some of the patients appeared to be quite deaf, but in others the labyrinth was not severely affected. Alexander states that, in most cases of congenital atresia, functional examination shows a normal condition of the labyrinth.

### (2) *Cases in which both the Bony and Membranous Labyrinths are affected. (Mondini's or Alexander's Type.)*

Ibsen and Makeprang have recorded five cases of this type of congenital deaf-mutism. They, however, did not examine their specimens microscopically. There are transition forms between Mondini's type of deaf-mutism and that of Scheibe (to be described later).

*Clinical Aspect.*—Alexander's case was completely deaf.

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Mayer's case was somewhat hard of hearing as a child, and suffered from tinnitus from the age of thirty years. The patient's wife, however, stated that he only became deaf five years before death, at the age of 75. Hearing tests carried out by Mayer showed nerve deafness, more marked on the left side. Alt's patient was deaf from birth, and a sister was also deaf, while a younger brother was hard of hearing. Functional tests showed complete deafness for speech, but musical tones and noises were heard. Hearing remains have not been observed in other cases belonging to this type of deafness.

*Middle Ear.*—In Alexander's case the right middle ear was normal, but the drum-head was remarkably oval. In Alt's case the drum-heads were normal, and the middle ear practically healthy.

*Bony Labyrinth.*—In Mondini's case, the whole bony capsule of the cochlea was flattened from base to apex. A more or less normal arrangement of the scalæ was only present at the lower part of the cochlea. In the upper part there was a wide common space, through the middle of which a thin ledge ran at right angles to the modiolus. The ledge was partly bony and partly cartilaginous. Alexander points out that a similar condition is seen at the second and third month of foetal life, and holds that in these cases normal development stops at this period. Alexander notes poor blood supply and pigmentation in his specimen. In Iwanow's case the scalæ of the middle coil communicated with one another as there was no dividing wall. The helicotrema was absent. In Schœnemann's case there was complete defect of the bony skeleton of the middle and apical coils. On the left side there was an osteoma growing from the remnant of the lamina. The bony partition between the middle and apical coils was absent in Mayer's case. As Alexander points out, this results in the formation of a scala communis.

*Vestibular Apparatus.*—Alt found the sacculus collapsed; the utricle showed no differentiation of sensory cells. The cristæ of canals were small. Alexander mentions atrophy of the maculæ of the utricle and saccule.

*Aqueduct of Vestibule and Saccus Endolymphaticus.*—In Mondini's and Schœnemann's cases the aqueduct of the vestibule was dilated and formed a gutter only closed by membrane posteriorly. (A similar condition has been noted by Gray in certain animals.) The saccus itself was very large and tensely filled.

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*Cochlear Duct and Corti's Organ.*—Alt notes that in his case the cochlear canal was collapsed and the epithelium replaced by darkly pigmented or hyaline masses. In Mayer's case the scala media was dilated in all coils. Alexander, Iwanow, and Schenemann also found atrophy and degeneration of the epithelium of the cochlear duct. Alexander noted that Corti's organ was absent in many places; in others it showed an embryonic form, *i.e.*, it consisted of a row of epithelial cells arranged at right angles to the basilar membrane, and not differentiated into hair, pillar, and other supporting cells. There was marked malformation of Corti's organ at the base and apex in Mayer's case, less marked in the middle coil. Alexander notes that in some parts the *stria vascularis* is absent, in others strongly developed, and shows many vessels. In Iwanow's case the *membrana tectoria* was atrophied.

*Spiral Ganglion and Cochlear Nerve.*—Alexander mentions that in his case the ganglion did not take a spiral course but was situated centrally in the modiolus. He believes that the faulty formation of the septa between the various scalæ is associated with the anomalous position of the spiral ganglion. In Alt's case the spiral ganglion was atrophied and connective tissue increased in the spiral canal. The fine branches of the cochlear nerve were reduced. Alexander points out that the condition of the cochlear nerve coincides with that in the lowest mammals—duckmole and echidna. The *stem of the eighth nerve* is as a rule much less atrophic than the peripheral branches. The central course of the eighth nerve was apparently normal in Alt's case.

**Explanation of the Changes found in Mondini's Type.**—Siebenmann attributes the condition to some abnormality occurring at the fourth month of embryonic life. Alexander points out that the embryonic membranous cochlea is at first covered in by a cartilaginous capsule which gradually assumes the external shape of the fully developed cochlea. A crest which divides off the various coils arises from the inner surface of this cartilaginous capsule and joins a membranous and, later, bony projection from the modiolus. The development of the cochlea takes place from base to apex, so that should the development be arrested at a certain point, these septa may fail to form, with the result that the scala vestibuli of one coil will communicate with the scali tympani of the next higher coil.

(3) *Congenital Malformation affecting both the (Membranous) Cochlear and Vestibular Apparatus.*

This clinical type of deaf-mutism is frequently associated with retinitis pigmentosa. Cases have been described by Lucaë, Siebenmann and Bing, Bezold, Alexander, Frey and Hammerschlag, Greeff, Oppikofer, Nager, and Kiichi Hane.

**Clinical Aspect.**—In the type of sporadic congenital deaf-mutism, to be described later (Scheibe type), in which the cochlea and saccule or the cochlea alone are involved, the vestibular reactions are normal. In the variety under consideration the vestibular reactions are absent (as in most cases of acquired deaf-mutism), or at least greatly diminished. Bezold's two cases showed uncertain gait and great diminution but not apparently complete absence of vestibular irritability. Bezold has examined two deaf patients suffering from retinitis pigmentosa. Of the four ears, one was quite deaf, whereas the other three showed a hearing island towards the middle of the scale. (It is interesting to note that in retinitis pigmentosa there is a contraction of the visual field corresponding to the contraction of the hearing field in these deaf-mute cases. According to Greeff the pathology of retinitis pigmentosa consists in hyaline changes in the vessels, which produce atrophy of the pigmented and sensory epithelium.) Frey and Hammerschlag confirm Bezold's findings in four cases of retinitis pigmentosa. Of these, three at least were mentally feeble. All four failed to react to rotation, while two had deaf-mute imbecile brothers or sisters. With regard to the galvanic reaction, Hammerschlag found that two out of three cases failed to react and that in the third the reaction was much diminished.

Oppikofer's cases were completely deaf from birth. A sister of one of the patients was congenitally deaf. In the second case the father and mother were born deaf. Another case had ten brothers and sisters; of these, seven had died young and two of the seven were deaf from birth. The patient was of poor mental development and walked with a broad base. The vestibular reactions were tested in one of the cases and were found to be absent.

Siebenmann and Bing's case was the fourth of eight children, of whom four were apparently born deaf. A brother of the patient's also had retinitis pigmentosa. The patient was quite

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deaf and the galvanic reaction was absent. Nager's case and also Alexander's were imbecile.

## Pathology :—

*Middle ears* normal.

*Vestibular Apparatus.*—Siebenmann and Bing found the maculae and cristae degenerated but the vestibular nerve and ganglion normal. Bing found no abnormalities in the central course of the vestibular nerve. In one of Oppikofer's cases the sacculus was dilated on the right side and collapsed on the left. In the other the right sacculus was normal. There was marked atrophy of the vestibular nerve and ganglion in both of Oppikofer's cases. The nerve endings were also atrophied. Nager found the vestibular nerve markedly atrophied and the aqueduct of the vestibule dilated. Hane noted slight atrophy of the cristae of the canals. The epithelial cells of the utricle were irregular and the hair cells absent or at least not recognisable. The vestibular nerve was atrophied.

*Cochlear Duct.*—This was dilated in both of Oppikofer's cases. Nager found the membranous cochlea dilated or collapsed and the sensory epithelium absent or badly developed. The cochlear duct was collapsed in Hane's case. The *spiral prominence* was absent in one of Oppikofer's cases, but in Hane's case it showed the form of a tumour. The *membrana tectoria* was shrunken in Hane's case. The *stria vascularis* was absent in both of Oppikofer's cases, hypoplastic and in parts absent in Siebenmann and Bing's case, and also in Hane's.

*Cochlear Nerve and Ganglion.*—The spiral ganglion was markedly atrophied in both of Oppikofer's cases and in Hane's case. Siebenmann and Bing, Nager and also Hane found that the stem of the cochlear nerve was markedly atrophied. The vascularity of the nerve endings in the cochlea and vestibule was poor. (This corresponds to the pathological changes in retinitis pigmentosa.)

*Brain.*—Bing found no meningitic changes, but noted sclerotic patches in the basilar artery and in the circle of Willis. The first two temporal convolutions, especially on the left side, were very small, and microscopic examination revealed senile endarteritis. The patient, however, was aged 79! Bing noted reduction in the layer of smaller pyramidal cells and marked alterations in the cochlear nuclei. He thought that the changes in the cortical hearing centre were secondary and due to inactivity. Lucae found the striæ acusticæ atrophic in his case.

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**Remarks.**—Little or no explanation has been given of the changes observed in this type of deaf-mutism. The outstanding features are, firstly, the alterations in the blood-vessels noted by some observers; secondly, the hypoplasia of the sensory epithelium in both parts of the membranous labyrinth; thirdly, the atrophy of the cochlear and vestibular ganglia; and, fourthly, the brain changes observed by Bing. According to Nager's view, Bing's observations are of great importance.

### (4) *Sacculo-Cochlear Degeneration. (Scheibe's Type.)*

This type of sporadic congenital deafness was first described in 1891 by Scheibe, who regarded it as a developmental anomaly. Further cases have been described by Alexander, Alt, Eschweiler, Goerke, Gray, Habermann, Katz, Lindt, Oppikofer, Panse, Quix, Schwabach, Siebenmann, and Watsuji. (The case already described in this paper belongs to the Scheibe type.)

**Clinical Aspect.**—Alexander estimates that about 70 per cent. of cases of congenital deaf-mutism belong to the "sacculo-cochlear" type, in which the utricle and canals (pars superior) are intact. Hearing remnants are usually present in these cases. The vestibular apparatus reacts normally to rotation and caloric tests. To illustrate the doubtful value of the histories obtained in cases of deaf-mutism, it is interesting to note that Scheibe's second case was stated to have become deaf as a result of fits during infancy, but the author holds that the child was really deaf from birth. Habermann's case was said to have become deaf at the age of 5 years, owing to a fall on the head, but Habermann does not believe this. Goerke's patient was born deaf. He married a normal hearing woman and they had five children, of whom the youngest was deaf-mute. Panse's patient and his brother were deaf from youth but three sisters heard well. In Oppikofer's case the parents of the patient heard well. They had seven sons and one daughter, and of these, three, including the patient, were deaf from birth. Oppikofer's patient, who was stone-deaf, married a deaf-mute woman whose brother was also a deaf-mute. The marriage produced one daughter, who was deaf, but had a normal vestibular apparatus.

### **Pathology :—**

*Middle Ear.*—In his original case Scheibe found adhesions in the tympanic cavity, and, in both of his cases, described atrophy



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of the tensor tympani. In Panse's case the posterior limb of the stapes was ankylosed to the window niche. Lindt's patient had suffered from otorrhœa. In one of Oppikofer's two cases there were traces of former suppurative otitis media. Habermann found the drumhead adherent to the promontory, which showed hyperostosis. The footplate of the stapes was ankylosed. As a rule, however, no changes are found in the middle ear. If present, these are merely accidental.

*Bony Labyrinth.*—This is usually normal, but in Lindt's case there was on one side an otosclerotic focus, though the stapes was not affected. Lindt holds that this focus was not congenital and that it had nothing to do with the patient's deaf-mutism. In Habermann's case the internal meatus was narrow. Gray has investigated four cases by his own method and found that the hollow spaces of the bony labyrinth were larger than normal.

*Utricle and Canals.*—The neuro-epithelium of the utricle and cristæ of the canals are normal in almost all cases, but in one of Scheibe's cases the nerve to the ampulla of the posterior canal was atrophied and colloid bodies were present in the ampulla.

*Sacculus.*—In Scheibe's original case there were no hair cells evident in the sacculus: the otolith membrane was surrounded by a layer of cells—a condition similar to that around the membrana tectoria in the cochlea in many cases. In Lindt's case the sacculus was almost completely collapsed and the neuro-epithelium absent for the most part. In Goerke's two cases the sacculus was collapsed but epithelial cells were present in parts. In Quix's case the right sacculus was almost obliterated but the left one was dilated. In Oppikofer's case the sacculus was collapsed. The ductus reuniens was obliterated in many cases.

*Cochlear Canal.*—This may be (1) collapsed in its entirety, or (2) dilated; (3) it may be dilated at one part and collapsed at another. If the canal is dilated, Reissner's membrane usually takes a vertical course upwards from the beginning of the limbus. The dilatation of the cochlear duct may be so great that the scala vestibuli is obliterated. If the canal is collapsed Reissner's membrane is usually adherent to the remains of Corti's organ or to the basilar membrane (Schwabach). In Oppikofer's case the cochlear canal was dilated on one side and collapsed on the other (as in the present case).

*Corti's Organ.*—Corti's organ itself may be absent in parts (Quix) or unrecognisable (Panse). In less severe degrees of the

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affection it may be replaced by cubical or rounded cells (Goerke) or merely "lower than normal," with only the remains of pillar cells (Oppikofer). In Scheibe's second case Corti's organ was almost normal in the upper coils. In numerous cases hyaline bodies are present in the cochlear canal, and in some there is a large amount of pigment present, as in Habermann's case.

The *membrana tectoria* is usually covered with epithelium and tucked into the internal spiral sulcus, or backwards on to Hushke's tooth. In other cases the *membrana tectoria* is attached across the *scala media* to the *stria vascularis* and covered on both surfaces with a layer of epithelium. In Oppikofer's case the *membrana tectoria* had, in parts, its normal position.

The *stria vascularis* may be absent (Habermann and Lindt), or replaced by flat epithelium (Scheibe, Eschweiler and Quix), or by hyaline masses. (Siebenmann calls these masses "colloid," Alexander "mucoid," while Lindt regards them as degenerative products of the epithelium.) The *stria* formed a polypoid projection into the *scala media* in at least two of Gray's four cases. The *stria* was absent or poorly developed in the basal part, normal in the middle portion, and markedly folded in the upper part in Oppikofer's case. The *spiral prominence* was normal in Scheibe's first case, small in Lindt's, and absent in Habermann's case. The *spiral ligament* showed dropsical degeneration in Panse's case.

The *spiral ganglion* usually shows atrophy, especially in the basal part. In Habermann's case only a few ganglion cells were left, along with connective tissue in the spiral canal. In Panse's first case the spiral ganglion was well formed on the right side but atrophied on the left. The ganglion was atrophied in Schwabach's and Oppikofer's cases, reduced in Quix's and also in Goerke's cases, and markedly degenerated in Gray's cases.

The *Fine Branches of the Cochlear Nerve* were atrophied in Habermann's, Oppikofer's, and Lindt's cases, and absent in Goerke's and in Panse's second case.

*Eighth Nerve.*—The stem of the cochlear nerve was atrophied on both sides in Scheibe's first case. In his second the eighth nerve appeared to be normal in size, but microscopically the cochlear branch showed atrophy. In Lindt's case the branch to the sacculus was very thin, and in Goerke's case this branch and also that to the posterior canal were

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considerably reduced: the stem of the cochlear nerve was degenerated. In two of Gray's cases the cochlear portion showed very few fibres.

*Brain.*—Numerous cysts were present in the brain in Scheibe's first case, and in the second there was cloudiness of the pia arachnoid. In Panse's second case the striæ acousticae were not to be seen.

Cases in which the changes are confined to the Membranous Cochlea and Nerve have been described by Katz, Oppikofer, Denker, and Quix. The middle ear and tympanic muscles, the labyrinth capsule, the sacculus and the *pars superior* of the membranous labyrinth are healthy. The normal condition of the sacculi in these cases has been attributed to closure of the ductus reuniens and consequent limitation of the malformation of the membranous cochlea. Otherwise the changes in the scala media are much the same as those described above.

**Explanation of the Changes.**—Various theories have been advanced to account for the abnormalities observed. The writer has attempted to group these theories under four headings.

(1) *Faulty Development.*—Oppikofer suggests that the otic vesicle may have been abnormally large, while the cartilaginous cochlea, which develops later, was of normal size. This explanation may account for the fold formation in the membranous cochlea. As an alternative, he suggests that the fold formation may have been due to adhesion of the walls of the cochlear canal, and cites as an analogy the formation of the membranous semicircular canals, which are originally hollow out-growths from the otic vesicle. The central portions of these out-growths become adherent and are absorbed, while only the peripheral part remains to form the canals. If the developmental disturbance occurs in the first two months of foetal life the membrana tectoria is not formed at all or lies as a rudiment in the internal spiral sulcus. In such cases the fine nerve branches and the spiral ganglion remain markedly undeveloped though a few fibres and ganglion cells are always found. If the developmental disturbance occurs later, the membrana tectoria may be properly formed and the ganglion and nerves well developed. Siebenmann has observed healthy nerve bundles, which can be traced to an almost completely degenerated Corti's organ. Habermann has examined anencephalous foetuses and has shown that Corti's organ may attain its full development even in the presence of severe disturbance of the

spiral ganglion. For this reason hypoplasia of the ganglion alone cannot be regarded as the cause of the changes in the sensory epithelium. (Oppikofer states that microscopical examination does not explain the slight remains of hearing in his case. He remarks that Siebenmann has demonstrated the ear of a deaf-mute who could hear all vowels and some consonants though Corti's organ was nowhere normal. According to Alexander, in about one-third of the cases circumscribed areas of Corti's organ and the nerve ganglia are functionally efficient, so that there are some remains of hearing.)

(2) *Hereditary Weakness of the Ear*.—Manasse and also Siebenmann have called attention to the similarity of the changes found in congenital deafness to those seen in chronic progressive labyrinthine deafness. There are, however, some differences, *e.g.*, degeneration of the macula of the saccule and bridge formation between the membrana tectoria and the stria vascularis have been observed in "congenital" but not in "progressive labyrinthine" deafness. Manasse refers especially to cases in which the epithelial metaplasia is confined to the basilar membrane. He believes that the atrophic degenerative process may occur in intra-uterine life, or may at least begin then and continue after birth. Politzer was the first to describe progressive labyrinthine deafness coming on in youth and resulting in marked diminution of hearing or even complete deafness. Politzer thought that the condition was due to an idiopathic atrophy of the acoustic nerve, but Alexander believes that some of the cases at any rate are closely allied to congenital labyrinthine deafness. Spira has called attention to the occurrence of ear disease—otitis media or nerve deafness—in certain families. As a rule the same part of the ear is affected both in parents and children; but in some cases the parents suffered from an inner ear affection, while the children had otitis media. Spira regards these conditions as due to an inherited local lack of resistance. Stein points out that this may be due to two factors—(1) faulty germinal plasma (heredity); (2) faulty intra- and extra-uterine conditions (environment). Gowers in 1902, and Edinger in 1904, called attention to the condition of "abiotrophy," in which there is a want of nervous energy to bear the strain of normal or excessive functional activity. Such conditions as progressive muscular atrophy, primary optic atrophy, and progressive nerve deafness belong to this category.

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(3) *Increased Pressure in Perilymphatic or Endolymphatic Spaces*.—Gray holds that the increase in the size of the hollow spaces of the bony labyrinth may be due to increased intralabyrinthine pressure during foetal or early post-foetal life. He thinks that there was increased pressure in the perilymphatic space transmitted from the cranial cavity through the aqueduct of the cochlea, and that this might account for the depressed condition of Reissner's membrane. Dilatation of the cochlear canal, on the other hand, may be due to increased secretion of endolymph from the enlarged *stria vascularis*. Quix believes that the explanation of the deaf-mutism is to be found in the *stria vascularis*, which is a secretory organ, and regulates the supply of endolymph. Habermann explains the polypoid condition of the *stria* as possibly due to a pull on it by Reissner's membrane which, in his case, was adherent to the *stria*. Oppikofer believes that the bridge of tissue connecting the membrana tectoria to the region of the *stria* is really the epithelium of the *stria* which had been separated from its connective tissue base. Oppikofer appears to suggest that there is a layer of epithelial cells which covers the *membrana tectoria*, Hushke's tooth and Corti's organ. These epithelial cells should normally disappear, while in deaf-mutism they remain. Gray holds that the condition of the *stria* in two of his cases indicates a process of repair occurring during foetal life. Pritchard considers that the hypertrophied condition of the *stria vascularis* resembles very closely the *tegmen vasculosum* in the cochlea of birds.

(4) *Inflammatory Changes: Meningitis*.—Siebenmann, Nager, and Oppikofer believe that the conditions present are due to an intra-uterine inflammatory process. It is common knowledge that meningitis is very frequent during the first year of life. Preysing has recorded two cases of otitis interna in sucklings. One was a complication of purulent meningitis and the other of enteritis and broncho-pneumonia. Both children, however, at the time of death were several days old. Siebenmann mentions the possibility of placental infection as the cause of meningitis in the foetus, when the mother is suffering from smallpox and other infectious diseases. Ballantyne records a case observed by Gradwohl of St Louis. The patient was a woman, aged 31, seven months pregnant, who suffered from pain in the left ear rapidly followed by coma. Well-marked signs of meningitis were present. The patient died undelivered.

Autopsy revealed acute nephritis and purulent basal meningitis. The fœtus also showed sero-purulent meningitis. Bacteriological examination of the cerebro-spinal fluid of both mother and fœtus revealed the diplococcus intra-cellularis, and the same organism was separated in pure culture from the left ear of the mother. So far, however, there is only the case of Haike which goes to prove the existence of an intra-uterine meningitic labyrinthitis. Great variations have been noticed with regard to the pigmentation of the labyrinth in cases of congenital deafness. In some there appears to be an excessive amount of pigmentation present, while in others the labyrinth pigment is absent. Habermann suggests that the pigmentation of Corti's organ in his case may have been due to an old hæmorrhage. Indeed Habermann thinks the whole condition may have been caused by an inflammatory affection in embryonic life. Herzog has produced labyrinthitis experimentally and found changes in the membranous labyrinth similar to those seen in congenital deaf-mutes. He therefore suggests that these latter may also have been due to inflammation.

### **Congenital Deafness and Otosclerosis.**

In the foregoing analysis of the various types or grades of developmental or congenital deafness (endemic and sporadic) it has been stated that cases have been examined by Habermann, Schwabach, Panse, Denker, Alexander, Lindt, and Nager, in which a focus of otosclerosis was found in the labyrinth capsule. The connection, if any, between the two conditions is by no means clear. Politzer reports a case in which both window niches were narrowed by hyperostoses. No trace of the stapes was present. Otosclerotic foci were present not only in the neighbourhood of the oval window but also in the region of the canals. The spiral ganglion cells were reduced. Corti's organ was well-formed only in the apical coil. Alexander believes that the presence of an area of otosclerosis in the labyrinth capsule in certain cases of deaf-mutism shows that there is a stepping-stone between congenital deafness and the various forms of congenital hardness of hearing. He believes that there is no doubt that the first rudiments of otosclerosis are often of congenital origin and that the ankylosis of the stapes and atrophy of the sensory epithelium are secondary. These congenital foci may exist without giving rise to symptoms until the age of

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puberty. Koerner believes that otosclerosis is due to certain determinants in the germinal cells of the parents, but is influenced by puberty, parturition, the climacteric period, and also by diseases of the middle ear. He explains cases of otosclerosis with no apparent heredity by supposing that the disease has skipped some generations. Hagener believes that the primary condition in otosclerosis is a change in the eighth nerve, and, in support of this, points to cases in which tinnitus is the first symptom of the disease. Manasse has shown that the nerve changes are the same in advanced otosclerosis and in pure nerve deafness. Further, we know that there are cases of atypical otosclerosis in which functional examination apparently shows pure deafness, and yet, on microscopic examination, a typical focus is found in the labyrinth capsule. Such cases have been recorded by Alexander, Kalenda, and Stern. Manasse finds that in otosclerosis there is little or no connection between the changes in the labyrinth capsule and the results of clinical examination. Even with a small bony focus we may have the clinical signs of otosclerosis, and, on microscopic examination, the well-marked picture of nerve deafness. Indeed in one case there was in the better hearing ear a focus of otosclerosis, while on the other side the labyrinth capsule was normal. Goerke apparently believes that the focus of pathological bone is only incidental and not of great importance. Nager, however, holds that if the otosclerotic focus adjoins the stapedio-vestibular ligament, we have the well-known Bezold's triad of signs.

Stein is of opinion that in otosclerotics there are always other diseases of degenerative origin. Hammerschlag notes that the bony changes characteristic of otosclerosis have been found in many cases of congenital deafness—not only in the hereditary degenerative (sporadic) type but also in endemic cases. He reminds us that there are families in which cases both of hereditary deafness and otosclerosis are to be found. These facts suggest that hereditary deafness and otosclerosis are to be regarded as different forms of one and the same pathological process.

Edinger has suggested that hereditary deafness appearing in middle age belongs to the group of wasting diseases, in which the normal demands of the organ cannot be replaced. Progressive nerve deafness is obviously to be included in this group and Goerke wishes to put otosclerosis into the same category.

**Deaf-mutism associated with Changes in the Brain.**

Castex has stated that in his experience deaf-mutism is usually due to changes in the cortical hearing area and much less often to changes in the ear. He believes that the cortical changes are due to meningitis which is sometimes intra-uterine. Brock states that Oppikofer, Schlittler, and Nager have examined the temporal bones of Endemic deaf-mutes (already reported in this paper) but have been unable to find pathological changes sufficient to account for the deafness observed during life. Brock therefore comes to the conclusion that we must give up the view that in all cases of deaf-mutism the explanation is to be found in malformation or disease of the ear. In his own case Brock noted atrophy of Corti's organ, of the fine nerve fibres going to it, and also of the ganglion cells supplying the basal part. Further, there was a collection of serum in the tympanic cavity, with swelling of the mucosa and fixation of the stapes to the promontory wall. These changes, however, do not, in Brock's opinion, account for the deafness which may be explained by alterations in the sensory hair cells too fine to be recognised by the microscope, or concealed by cadaveric changes. Alternatively Brock suggests that the lesion is not in the peripheral organ but is of central origin.

The question of deafness due to brain lesions is a very difficult one. Microscopic examination of the hearing tracts and centres is a long and tedious process and requires great experience for the proper interpretation of the appearances presented by the different layers of the cortical hearing centre. Probably few, if any, otologists possess this knowledge, and it is therefore necessary for the otologist, who examines the labyrinth, to work in conjunction with a neuro-histologist capable of interpreting the appearances in the brain.

*(To be continued.)*



## CLINICAL RECORDS

### A CASE OF FATAL MENINGITIS FOLLOWING SUB-MUCOUS RESECTION OF THE NASAL SEPTUM

#### *Post-Mortem Discovery of Latent Sphenoidal Sinusitis.*

By W. ELIAS POWELL, M.B., The Royal Infirmary, Manchester.

A PATIENT, A. B. W., aged 20, was admitted to the Royal Infirmary on 12th August 1921, for operative cure of a deflected nasal septum.

He gave a history of trauma thirteen years previously, followed by the onset of stuffiness of both nostrils, frequent colds, and nasal catarrh, with occasional severe occipital headaches.

No X-ray examination was made. He was found to have an S-shaped deflection of the septum, with moderate hypertrophy of both middle turbinal bodies. The teeth, tonsils, and fauces were normal.

Operation was performed under general anæsthesia—chloroform—on 17th August. The cartilage was removed by Killian's method, and finger-stall splints were put into both nostrils.

On the evening of operation he complained of headache; his temperature was  $99.2^{\circ}$ , and his pulse 96 and of good quality. He slept fairly well during the night. The following morning he still complained of headache. His temperature was  $98.2^{\circ}$ , and his pulse 76. Aspirin, gr. xx., was prescribed and the splints removed; this was followed by slight bleeding.

Shortly after mid-day he became suddenly very ill, his temperature rose rapidly to  $102^{\circ}$ , and his pulse to 110. He became quickly unconscious. His pupils were equal and reacted to light; the eye movements were normal. There was no head retraction, but Kernig's sign was definitely present, together with flexor spasms of the arms and hands.

Lumbar puncture was done immediately, followed by the injection of 15 cc. of a solution of hexamine intrathecally. About 20 cc. of cerebro-spinal fluid were withdrawn. The fluid was under considerable pressure and markedly turbid. Calomel, gr. v., was given and ice-bags to the head were ordered.

Three hours later the patient was still in the same condition, with the exception of a fall in temperature to  $101.2^{\circ}$ . A second lumbar puncture was then done; the fluid was turbid, but under less pressure than before. A second injection of 15 cc. of Hexamine solution was given, and the greater part of gr. xx. of Quinine Sulphate by mouth.

The patient became steadily worse, his pulse rate increased, and

# Clinical Records

the temperature fell to 100°. He died at midnight, scarcely twelve hours after the onset of acute symptoms.

*Post-mortem* examination of the head and brain showed acute purulent lepto-meningitis. There was no sign of operative trauma to the base of the skull. The bone postero-lateral to the cribriform plate of the ethmoid on the right side seemed brittle, and came away easily with the forceps.

The ethmoidal air cells contained some blood, and the sphenoidal sinuses were found to contain plugs of mucopus.

The post-mortem findings seem to show that in this case the fatal meningitis was caused by extension of the latent suppuration in the sphenoidal sinuses.

## FOREIGN BODY IN RIGHT BRONCHUS

By T. ARTHUR MACGIBBON, F.R.C.S.E., Christchurch, N.Z.

A YOUNG woman about 35 years of age was brought to me with a history of having inspired "something" during the extraction of teeth three weeks previously. Dr Bevan-Brown, of this town, detected some râles in the lower lobe of the right lung.

The X-rays showed a dense foreign body in the lower lobe, which moved between the sixth and fourth interspaces during respiration. The body was uniformly dense and was judged to be a piece of metal, probably an amalgam cap or crown.

I passed Chevalier Jackson's bronchoscope down the main-stem bronchus and pumped out mucopus. Two days later I passed the bronchoscope again, on this occasion combined with the X-rays. The lip of the tube was found to reach the foreign body, but I could not see it. I saw one bronchus with mucopus in it, but, after wiping the fluid away, I could not locate the metal. The following night I made my third attempt, pumped out the mucopus but could not see the foreign body though the X-rays showed the tube lying above it. I then used a small right-angled probe and passed it over the carina of the bronchus, tilting up the crown. I was now able to remove the foreign body by Jackson's forceps.

The patient recovered after ten days.

# Facial Paralysis

## FACIAL PARALYSIS ASSOCIATED WITH ACUTE MIDDLE-EAR SUPPURATION

By ERNEST CULPIN, Brisbane.

IN the issue of the Journal, July 1921, an abstract is published entitled, "Facial Paralysis as an Indication for the Mastoid Operation in Acute Middle-Ear Suppuration." In this connection the following case, recently under my care, is of interest.

In April 1921, I was asked to see, at the Brisbane General Hospital, a male, aged 32, suffering from chronic nasal obstruction and an acute tonsillitis. When the acute symptoms had subsided, I removed the two septic tonsils, finding, at the same time, a pocket of pus external to the right tonsil. One month later I performed a submucous resection of the septum, and four days later I discharged him from hospital.

After an interval of one week he attended the Out-patient Department with an acute otitis media on the right side; there was a moderate amount of discharge and a fairly large posterior central perforation. There was almost complete right facial paralysis.

The patient gave the following history:—Three days after returning home he noticed an alteration in the right side of the face and had pain at the root of the nose. Shortly afterwards pain was felt in the right ear and in twenty-four hours it discharged. When admitted to hospital he stated that the paralysis was less marked.

He was prepared for operation on the following morning, but as the ear was drier and the paralysis less evident, operation was postponed. Steady improvement continued; the perforation healed, the paralysis disappeared, and the hearing was restored.

# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

October 18th, 1921.

*President*—Dr A. LOGAN TURNER.

THE President in his introductory remarks thanked the members of the Section for the high honour which they had conferred upon him. He pointed out that the prestige of otology in this country lay largely in the hands of members of the Section. Many problems had still to be solved, and he urged the younger members to concentrate upon some particular piece of investigation which would reflect credit upon themselves and give additional kudos to the position of Otology in this country.

He referred to the recent inauguration, by the American College of Surgeons, of a Department of Literary Research, by means of which analyses, reviews, and statistics of the work of all the Fellows of the College might be collected, and deductions drawn from them upon a broad scale. If the Surgeons in charge of the Departments for Ear, Nose, and Throat diseases in all the large centres in Great Britain would publish annually the reports of their departmental work, really valuable deductions might be drawn from a collective study of them, and the *Journal of Laryngology* might be utilised as the medium of their publication. During the fifteen years in which he had held the post of hospital surgeon, annual reports had been issued from the department, but these dealt with only a limited amount of material. If the same were produced upon the scale which he suggested, their value would be enormously increased.

He had chosen for the main subject of his address, "The Structural Type of the Mastoid Process based upon the Skiagraphic Examination of 1000 Crania of Various Races of Mankind." The investigation had been commenced in 1913, in conjunction with his friend and colleague the late Major W. G. Porter, D.S.O., formerly a member of the Section, and it was through the energy and enthusiasm of Dr Porter, who had himself radiographed the skulls, that the deductions which he (the President) was about to bring forward had been made possible. The craniological collection in the Anatomical Museum of the University of Edinburgh had been put at their disposal by Professor Arthur Robinson.

(The Address will be published *in extenso* in the *Journal of Laryngology*.)

# Royal Society of Medicine

**A Method of Diagnostic Exploration of the Posterior Ethmoidal Cells**—DRS P. WATSON-WILLIAMS and E. WATSON-WILLIAMS. (Paper published in the *Journal of Laryngology*, October 1921.)

**Case of Vertigo, due to Cholesteatoma of Attic, cured by Ossiculectomy**—Sir J. DUNDAS-GRANT.—Female, aged 40, seen in April 1910, complaining of attacks of vertigo with loss of consciousness and occasional double vision, two or three times a month for several months. The left ear had discharged pus off and on since childhood.

On examination there was a large perforation in the attic, through which desquamative material protruded; it was obvious that the cholesteatomatous material was being blocked up by the presence of the ossicles. Ossiculectomy was performed next day, and beyond an occasional slight "swimming" from that time she had been free from pain and vertigo.

**Pigeon Sixteen Months after a Single Application of Alcohol to the left Membranous Labyrinth**—Mr SYDNEY SCOTT.—When the pigeon is placed on a perch it rotates the head on an antero-posterior axis with the vertex of the head to the left and downwards, so that the right eye looks to the left side and the left eye looks to the right. It will remain in this position for several minutes at a time, and then assumes the normal position unless excited or disturbed.

Dr A. A. GRAY asked whether any loss of muscular tone had been noted, as a theory had been propounded that the labyrinth was the organ of muscular tone.

Mr O'MALLEY wished to know if there had been striking disturbance in equilibrium immediately after the operation.

Mr SYDNEY SCOTT (in reply) said the pigeon was the only survivor, after sixteen months, of the thirteen birds operated upon. Some of the birds had died because they could not feed themselves. The survivor could feed itself, doing so at first by approaching the food sideways. Mr Scott did not know how he could ascertain the existence of loss of tone in the pigeon, and he had never been able to satisfy himself that there was loss of tone in human beings after destruction of the labyrinth, though patients had stated that they were conscious of a feeling of weakness in the extremities on the same side as the labyrinthine lesion.

**Case of (?) Ossification of the Tympanic Membrane round a Perforation**—Mr T. H. JUST.—Female, aged 60, complained of deafness and tinnitus, especially in the left ear, which had been increasing for the last three years. There was no history of otorrhœa. In the left ear the membrane was scarred and showed a large, dry, posterior perforation, around which was well-marked ossification. The right membrane showed a similar condition, but less advanced.

**Tumour of External Auditory Meatus**—Mr T. H. JUST.—Female, aged 60, had noticed the swelling for six years. It had

## Societies' Proceedings

steadily increased, causing deafness. The tympanic membrane was normal. The secretion which accumulated in the meatus did not come from the middle ear.

**Patient showing Results after a Bilateral Schwartz Operation**—Mr LIONEL COLLEDGE.—Female, aged 6, on 1st December 1920, had the Schwartz operation on the left mastoid for acute supuration; on 4th December 1920, a similar operation on the right ear.

The perforation in the tympanic membrane had healed in both ears and all supuration had ceased. The wound in the right mastoid had filled up and healed in the normal way, but a large, dry cavity persisted in the left mastoid. Both sides were treated in the same manner.

Dr P. MACDONALD had had a similar case in which one side healed up, but on the other, a comparatively large probe could be passed into a cavity. The wound had, at first, been packed with gauze, but later, it had been discontinued. The lining of the cavity was not skin, but the ordinary mastoid cell lining.

Mr SYDNEY SCOTT thought that gauze packing contributed to such a result.

Sir JAMES DUNDAS-GRANT said that, when there was a large mastoid cavity, removal of the posterior osseous meatal wall without perforating the membranous part would allow of collapse of the soft parts into the mastoid cavity.

Mr G. J. JENKINS thought that, in this case, the mucous membrane had not been completely removed from the antrum and that the bone cavity was partly lined with mucosa. If the cavity were large, this would take place rapidly before the granulations at the surface had been able to come together and close the opening.

**Extra-dural Abscess with Extensive Sloughing of Dura Mater**—Mr BUCKLAND JONES.—Male, aged 25, on 5th August 1920, had slight discharge from left ear with deafness; on 19th April 1921, severe headaches and tenderness over mastoid. Operation advised, but refused. On 11th May 1921, patient admitted collapsed. Mastoid operation performed; antral tegmen found necrosed; large quantity of stinking fluid and pus. Middle fossa was exposed and extensive sloughing of dura found. Lumbar puncture; cerebro-spinal fluid was clear and sterile.

On 18th May slight rise of temperature and headaches; the opening was extended anteriorly and the temporal muscle divided: a slough 4 in. by  $1\frac{1}{2}$  in. was exposed. A vaccine of *Bacillus coli communis* and Streptococcus was administered. The slough entirely separated in five to six weeks.

On 7th October 1921 general condition was good.

Mr SYDNEY SCOTT related a somewhat similar case in which he had found a large mastoid cavity with a sloughing dura mater exposed by the disease. The latter gave way under pressure of the finger, followed

## Ear

by an outpouring of cerebro-spinal fluid as if from a tap, towels becoming saturated with it. The brain cortex did not advance and occlude the opening. The patient did not recover consciousness after the operation, and died in sixteen hours.

**Epithelioma of Auricle**—Mr LIONEL COLLEDGE.—Patient, a male, six weeks before admission, noticed a small pimple on the right auricle; he scratched this and a rapidly developing ulcer formed; the edges were sharply cut; the auricle swollen and tender; small hard glands were palpable over the mastoid process and in the posterior triangle; the cartilage in the floor of the ulcer was necrosed. Pathological report—epithelioma with typical cell nests. Wassermann negative.

Mr NORMAN PATTERSON advised removal of the auricle and mastoid process, exposure of the lateral sinus, and its closure by a gauze plug between the sinus and the skull, and free dissection of the glands in the neck.

Mr MUSGRAVE WOODMAN favoured a similar extensive operation. He had been struck with the rapidity of growth of epithelioma in the external auditory meatus. He had recently seen a case in which a small epithelioma of the skin of the meatus had grown rapidly, causing facial paralysis, necrosis of the mastoid, exposure of the lateral sinus and infiltration of the dura mater. *Post-mortem* examination showed invasion of the temporo-sphenoidal lobe by the tumour.

## ABSTRACTS

### EAR.

*Further Remarks Concerning the Acoustic Neuromas.* HARVEY CUSHING. (*Laryngoscope*, Vol. xxxi., No. 4, p. 209.)

The author has collected 639 verified brain tumours; of these 7.3 per cent. were acoustic neuromas; of all tumours with symptoms pointing unmistakably to the cerebellopontine angle, the larger percentage were acoustic neuromata (47 in 60 cases).

The present series consists of 19 cases, and the operation mortality is 15.8 per cent. as compared with 20.7 per cent. in the previous series of 29 cases. If two cases, which died forty-six and fifty-two days after operation from other than operative complications, were omitted, there would only be one fatal result in 19 cases. Fourteen of this series presented straightforward symptoms, and the result in each case was satisfactory. Histories of the fatal cases are given. It is regrettable to read of the numerous nasal operations some of the cases had undergone for cure of deafness or as a diagnostic measure.

Dr Cushing is strongly in favour of the suboccipital route, and

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condemns the translabyrinthine approach. The intracapsular enucleation as practised by the author is very often incomplete, but he holds that, till earlier diagnosis is the rule, it is not possible to do a radical removal consistent with reasonable safety, owing to the large size of the tumours and other difficulties of complete removal, such as fibrous elements, vascularity, etc. In fact the enucleation depends to a large extent on the amount of fatty degeneration in the neuroma—the more the better. Even if removal is abandoned, benefit still results from the wide decompression.

The author entertains the hope that otologists will look with suspicion on a case of unilateral nerve deafness and tinnitus coming on without assignable cause. The deafness is by far the earliest symptom. "When tumour symptoms, therefore, point to the recess and begin with deafness, one may feel fairly certain of a diagnosis." Operation, before signs and symptoms of pressure show themselves, is an ideal not yet achievable.

ANDREW CAMPBELL.

*Tuberculosis of the Middle Ear.* F. LEEGAARD, Norway.  
(*Laryngoscope*, Vol. xxxi., No. 6, p. 374.)

Two hundred cases were operated on and were examined, and of these 20 were proved to be tubercular. Tuberculosis was found most frequently between the ages of one and ten. The diagnosis is by no means easy. Multiple perforations were found only in phthisical subjects. Tubercles in the drum-head were rare but characteristic. Facial paralysis occurs in advanced cases, and is of significance as regards prognosis. Pale and flabby granulations were not characteristic, but when present a putty-like mass greyish or yellowish white in colour is proof of tuberculosis. The author states that to distinguish between tuberculous and other middle-ear disease by clinical symptoms and findings at operation is difficult, but the course of the operation wound is characteristic. The wound does not heal rapidly. He recommends operation and advises the local application of tuberculin. All strains of the bacilli in the 20 cases were of the human type.

ANDREW CAMPBELL.

*Parotid Swellings of Aural Origin.* L. REVERCHON and G. WORMS.  
(*Revue de Laryngologie*, March 1921.)

The authors distinguish two forms of parotid swellings secondary to inflammatory conditions of the ear:—(1) Diffuse swelling, often very persistent, or permanent, due to lymphadenitis and periglandular cellulitis of the parotid lymphatic glands. The source of infection is some chronic inflammatory condition of the skin of the pinna or around the ear. There is no change in the parotid secretion. This condition is fairly common. (2) Swelling of the parotid gland itself.



## Nose and Accessory Sinuses

This swelling is marked by paroxysmal exacerbations, tenderness to pressure, pain in the ear, and greatly increased secretion of saliva, rich in mucin. The exciting cause is believed to be irritation of the secretory nerves, which are branches of the auriculo-temporal. Leriche and Aigrot trace these secretory fibres from the glosso-pharyngeal, *via* Jacobson's nerve, the small deep petrosal nerve, the otic ganglion, the inferior maxillary branch of the 5th, and thence to the auriculo-temporal. In two cases reported by the writers chronic suppuration of the middle ear was present, with exposure of the promontory through a large perforation of the tympanic membrane. The promontory was exquisitely tender to the touch of a probe.

G. WILKINSON.

*X-ray Treatment of Two Cases of Otosclerosis.* J. H. DOUGLAS WEBSTER. (*Archives of Radiology and Electrotherapy*, No. 253, August 1921.)

As an introduction to the description of the cases, Dr Webster gives a very brief *résumé* of the history, literature, and some of the theories of otosclerosis. He mentions the early attempts at X-ray treatment, and hints at Prof. Siebenmann's method of X-ray therapeutics which the author has adopted. He does not, however, describe the method, as Dr Siebenmann's paper is not yet published, though his results are said to be "to a small degree positively encouraging." In one of the cases reported, after over three months' treatment, there has been distinct improvement in the hearing and in the low pitched tinnitus, but in both cases Dr Webster concludes "the condition has been stationary during the period of treatment, and it will require another year or two to show if the affection is progressive."

G. EWART MARTIN.

### NOSE AND ACCESSORY SINUSES.

*Lymphangio-Sarcoma of the Naso-Pharynx.* GEORGES PORTMANN (of Bordeaux). (*Bulletin de la Société Anatomique de Paris*, July 1920.)

The author observed in the naso-pharynx of a patient a tumour on the right half of the cavum, a large fragment of which was extracted on passing the finger into the post-nasal space. The fragment, of soft consistency, reddish colour and spongy texture, had the appearance of a mass of adenoid vegetations.

The anatomical pathological examination established the presence of two associated neoplasms: (a) a sarcoma having round cells in

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some places and spindle-shaped cells in others ; (*b*) a genuine capillary lymphangioma.

The name "capillary lymphangioma" was justified by the great abundance of lymphatic vessels, their considerable size and their reticulated structure, such as could not exist in the lymphatic vessels of a healthy mucous membrane.

This appearance accounted for the softness and sponginess of the tumour, being quite abnormal in a sarcoma of that part and justifying the name of *lymphangio-sarcoma*. AUTHOR'S ABSTRACT.

*Treatment of Ethmoidal Suppuration by the Nasal Route.* GEORGES PORTMANN. (*Presse Médicale*, No. 24, 21st April 1920.)

The infection of the ethmoidal labyrinth is a frequent cause of interminable rhinitis, which is the despair of patients. The author points out that the disease is still too often disregarded, but considers that when it is treated systematically and radically, this being the only efficient method, the prognosis is greatly improved.

Portmann, following the Bordeaux School, is a convinced adherent to the radical operation by the nasal route. He describes his technique:—Local anæsthesia with cocaine (10 per cent.), ablation of polypi by means of a cold snare ; division, with "bec de canard" scissors, of the middle turbinated bone and ethmoidal cells within reach. The ethmoidal labyrinth being open, a *thorough cleansing* of the ethmoid is then secured by means of Moure's scoop, an instrument rendered harmless by its shape.

The hæmorrhage is generally slight. No packing or post-operative local treatment is carried out. No washing or pulverisation is required. This operation gives good results and deserves to be widely practised.

AUTHOR'S ABSTRACT.

*The Treatment of Ozena.* BRUNO GRIESMAN. (*Münchener Medizinische Wochenschrift*, 68 Jahr., No. 27.)

So long as the exact ætiology of this disease remains in doubt the treatment must continue to be empirical and symptomatic.

Surgical treatment as advocated by Lautenschläger and modified by Halle should only be undertaken after the failure of conservative therapy and the elimination by surgical means of any co-existing sinus disease.

The small percentage of cures (8-10 per cent.) claimed by Hofer from his vaccine therapy makes one question whether his successes are actually due to an acquired immunity or to the peculiar effect of this protein therapy.

Until the indications for the above forms of therapy become more defined the main treatment must continue to be the employment of

# Pharynx

solvent and antiseptic solutions to wash out the nose, whilst implanted or injected paraffin is used to remedy the atrophy.

The digestive ferments pepsin and trypsin are very efficacious crust solvents. As the former requires an acid medium it may be dissolved in boric acid solution, whilst in the case of the alkaline active trypsin a solution of sodium bicarbonate may be employed. The addition of a mixture of crystalline carbolic acid and camphor, known as Aphlogol, imparts an added efficiency to both solutions. These solutions are specially prepared by the Kaiser-Friedrich-Apotheke, Berlin N.W. 6, Karlstr. 20, under the pseudonyms of Acrustin-P and Acrustin-T.

The patient is expressly directed to use a nose *bath* of the Katzenstein variety. The external nose is smeared with vaseline. The head is inclined 90° forward so that both the nasal apertures lie as deeply as possible in a tumbler of lukewarm water in which has been dissolved as much Acrustin as would fit on the point of a knife. The bath is continued for from ten to fifteen minutes, gentle inhalation of the fluid being made at intervals. It is repeated once daily, and in the meanwhile the powdered Acrustin is to be used as an ordinary snuff.

A permanent cure of Ozaena is not to be expected from this treatment, but both subjectively and objectively in most cases a symptomatic improvement will become evident. The patient feels better, crusts and fœtor become less, and the psychical condition of the patient is improved.

JAMES B. HORGAN.

## PHARYNX.

*The Occurrence of Peritonsillar Abscess in Families.* F. LEEGAARD.  
(*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 and 2.)

The author has been struck by the fact that many patients suffering from peritonsillar abscess mention cases of the same disease in other members of their families. On investigating the matter, he found that of 120 patients suffering from peritonsillar abscess, 76 had relations who had suffered from a "throat abscess," the total number of such relatives amounting to 154. The affected relatives were, moreover, in most cases nearly related to the patients, being in 81 cases brothers or sisters and in 32 parents. On the other hand, of 120 unselected patients who had never suffered from a "throat abscess," only 10 could recall the occurrence of such a disease in their families, and in a majority of these 10 more than one relative had been affected.

It may be regarded, therefore, as "almost proved" that there is a family tendency to peritonsillar abscess, and the question arises as to whether the well-known tendency in many individuals to recurrence of the disease depends upon a congenital predisposition,

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or, as has been suggested, to scarring and adhesions causing retention of septic material. That the main factor is a congenital predisposition is indicated by the discovery that the family tendency was present in three quarters of the patients who had suffered from recurrent attacks, while it was present in only one third of those who had experienced only one attack.

As peritonsillar abscess is an acute localised disease occurring in patients not especially prone to primary phlegmonous inflammation in other parts of the body, the family tendency or predisposition must almost certainly be due to local anatomical conditions, such as especially long and narrow crypts, or folds and curves in the structures surrounding the tonsils, leading to retention of infective material.

THOMAS GUTHRIE.

*Tonsillar Adenitis.* GEORGES PORTMANN (of Bordeaux). (*Revue de Laryngologie d'Otologie et de Rhinologie*, No. 12, 30th June 1920.)

The author gives this name to an inflammatory growth of the palatine tonsils, which is a subacute hypertrophy, clinically and histologically different from chronic hypertrophy and acute tonsillitis.

Tonsillar adenitis, an affection of children and youths, occurs in a sound normal tonsil which has previously undergone tonsillotomy. It is not caused by any common infection.

Histologically, it offers the characteristics of a double lesion corresponding both to simple lymphoid hypertrophy and a sub-inflammation, *i.e.*, it is a subacute tonsillitis with lymphoid hyperplasia, without other macroscopic manifestation than a notable increase in the size of the tonsil.

The local symptomatology lies solely in the great size of the tonsil, without conspicuous alteration of its surface; the mucous membrane is neither ulcerated nor bleeding, and is covered by no exudate or caseous matter. There is frequent co-existence of an hypertrophy of the lingual and pharyngeal tonsils and of the sub-maxillary and carotid lymphatic glands.

The functional symptoms, produced by the volume of the organ, are those of chronic hypertrophy.

The evolution is typical, for, being essentially subacute, tonsillar hypertrophy establishes itself in the course of three or four days, with cervical adenitis and without general symptoms: after a period of two or three weeks the swelling subsides, and in four or five weeks returns to normal.

The diagnosis of tonsillar adenitis, as differing from chronic hypertrophy and acute tonsillitis, offers no difficulty, the evolution, local appearance, and general symptoms being quite distinct; clinical examination also distinguishes it from lymphomatosis and lympho-

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sarcoma. But there are two affections which it is practically impossible to discriminate from tonsillar adenitis and for which the help of the laboratory is absolutely necessary, namely, secondary syphilitic hypertrophy and the hypertrophic form of tuberculous tonsillitis. Liability to relapse is a characteristic phenomenon.

AUTHOR'S ABSTRACT.

*Chronic Tonsillar Infections.* Drs H. B. ANDERSON, R. W. MANN, and C. N. SHARPE. (*Can. Journ. of Med. and Surg.*, Jan. 1921.)

This paper embodies the results of a long series of investigations on a large number of patients. It differs from most other papers on the subject in that it does not deal with the epidemic forms of tonsillar infection, but is a study of the ambulatory sick from widely distributed areas and conditions in the province of Ontario. In all, 937 patients were examined, and of these 623, or 66 per cent., showed definite clinical evidence of tonsillar infection. Each case was investigated with regard to the following points:—

- (a) History of attacks of tonsillitis.
- (b) History of systemic disease due to focal infection.
- (c) Evidence of coincident infection of teeth, sinuses, etc.
- (d) Excessive secretion in throat.
- (e) Appearance of tonsils, size, colour, fissured, ragged, etc.
- (f) Results of firm pressure on tonsils, character of exudate.
- (g) Presence of enlarged cervical glands.
- (h) Bacteriological examination of swabs from tonsil crypts.

In this series *Streptococcus viridans* was found in 260 cases or 27.8 per cent., though there was a marked seasonal variation, being lowest in autumn, namely, 4.2 per cent. in October, and highest in the early months of the year, namely 75 per cent. in February.

“A large percentage of the adult population of the class seeking private consultation present definite evidences of tonsillar disease, associated with the presence of pathogenic organisms, producing or capable of producing, under conditions favourable to general infection, more or less serious systemic symptoms. In our experience in the chronically ill, typically healthy tonsils are the exception rather than the rule.”

In 574 cases the patients had the following associated conditions:—

- (1) Rheumatic group (arthritis, lumbago, etc.), 27.1 per cent.
- (2) Cardiovascular (valvular disease, hypertension, etc.), 20 per cent.
- (3) Goitre, 17.4 per cent.
- (4) Gastrointestinal, 20 per cent.
- (5) Diabetes, 4 per cent.
- (6) Respiratory diseases (bronchitis, asthma, etc.), 5 per cent.

J. K. MILNE DICKIE.

## Reviews of Books

*Juvenile Naso-pharyngeal Fibroma—Report of Case treated by Kocher's Osteoplastic Method.* GREGORY A. WALL. (*Laryngoscope*, Vol. xxxi., No. 5, p. 287.)

Owing to continued and serious hæmorrhage it was decided to operate on this case of naso-pharyngeal fibroma by the Kocher method. The external carotid was ligatured and intratracheal ether administered. Both upper jaws were cut through immediately above the teeth and temporarily reflected. Hæmorrhage was copious, and it is doubtful if more than a part of the tumour was removed. There was considerable shock. The parts were united with wire, etc., and recovery was uneventful. The result was satisfactory as the tumour disappeared.

ANDREW CAMPBELL.

## REVIEWS OF BOOKS

*A Guide to Diseases of the Nose and Throat, and their Treatment.* CHARLES A. PARKER, F.R.C.S., Edinburgh; LIONEL COLLEDGE, M.B., F.R.C.S. Second Edition. London: Edward Arnold, 1921.

The first edition of this work, published in 1906 with Mr Charles A. Parker as its sole author, was reviewed in *The Journal of Laryngology* in July 1907. In the second edition now dealt with, Mr Colledge is associated with Mr Parker as joint-author. The long interval of fifteen years which has elapsed since the first edition was published has necessitated very considerable alterations in this edition to bring it abreast of the advances made in the specialty.

The special purpose of the work as a guide to practitioners taking a postgraduate course in diseases of the Upper Respiratory Tract is maintained. The general arrangement of the work is unaltered. Experience and judgment are shown in presenting an eminently practical account of what may be taken as the generally accepted practice in this country. The work is excellently printed, well and profusely illustrated, and the many prescriptions embodied in the text should prove most helpful. No references are given, the work presenting the practice of the authors as the result of experience.

A few minor criticisms may prove helpful. On page 14 the use of Hay's pharyngoscope is half-heartedly suggested as an alternative to posterior rhinoscopy, where the latter proves unsuccessful. We suggest that Holmes' instrument used through the nose is greatly superior for this purpose. Plugging the nose with ribbon gauze is advocated when a plug is necessary. We would suggest that a finger stall filled with gauze is both less septic and less painful.

## Letter to Editors

The description of choanal polypi is not perhaps quite happy. No mention is made of their occurrence in children, and the statement (p. 356) that they have no tendency to recur after simple removal would not obtain universal acceptance.

In describing the external operation on the frontal sinus no mention is made of the great value of a preliminary skiagram.

In the section dealing with adenoids, more emphasis might be laid on the fact that the presence of the adenoid facies, chest deformity, etc., is an indication that operation has been postponed too long, and that these signs are not essential for diagnosis. The "best age" for operation is in our opinion not "between 5 and 8 years," but whenever symptoms exist. Much harm is often done by expecting, or waiting for, the classical signs and symptoms before operation is considered necessary.

In conclusion, we can cordially recommend this work as a practical guide to the postgraduate student.

A. J. WRIGHT.

*Practical Tuberculosis.* HERBERT F. GAMMONS, M.D., 8vo, p. 158.  
Published by Henry Kimpton, 1921.

The little work bearing this "portmanteau" title is an essay on phthisis by the superintendent of the Woodlawn Sanatorium, Dallas, Texas, and purports to be "a book for the general practitioner and those interested in tuberculosis." In our experience American textbooks are either very good or, on the contrary, poor, and this one belongs to the latter class. The whole book is a collection of loose and frequently very questionable statements, for which, as a rule, no reason is given.

We cannot think that the book will be of much use to any general practitioner who has qualified in this country, and still less to anyone "specially interested in tuberculosis."

R. A. WORTHINGTON.

## LETTER TO EDITORS

TO THE EDITORS,

*The Journal of Laryngology.*

SIR,—Professor Chevalier Jackson, in his interesting Critical Review of Peroral Endoscopy in the November number of the Journal, appears to throw doubt upon the value of tracheal or lower as compared with upper bronchoscopy, because "a tube too large to go through the larynx will not enter either main bronchus," and conversely a

## General Notes

tube that will enter the main bronchi "will readily pass through the normal larynx." While this may settle the question for Professor Jackson with his great skill and probably unrivalled experience, one cannot help feeling that for those of less ability and experience who are called upon to remove a foreign body from the bronchus of, say, an infant under one year of age, the following points are worthy of consideration.

(1) Subglottic swelling necessitating an emergency tracheotomy may, in such a case, follow upper bronchoscopy, especially if the case has been a difficult one, and the manipulations prolonged. It can hardly be questioned that an emergency tracheotomy to relieve urgent dyspnoea following some hours after the main operation will entail a much greater risk to life than a preliminary tracheotomy.

(2) In order to remove a foreign body from a main bronchus, it may, in some cases, be sufficient to pass the tube down to the orifice of the bronchus without actually entering its lumen. In such a case a wider tube can be used by lower than by upper bronchoscopy.

(3) It is surely important to consider not only the diameter of the tube which can be employed, but also its length, and I would suggest that to the average operator when dealing with the class of case to which I refer, it is of very great value to be able to use as short a tube and get, so to speak, as near to the foreign body as possible. Whether the latter be in a main bronchus or in one of the smaller branches, proximity to it will be much favoured by approach through a tracheotomy opening. Most people will agree that, other things being equal, it is much more easy to remove, say, an impacted tooth-plate from near the upper than from near the lower end of the œsophagus. To me, at least, every additional inch of tube appears to increase the difficulty, and the narrower the lumen of the tube the more is this the case. Surely the advantages of a short tube such as one may use through a tracheotomy wound in an infant are not to be despised?—I am, yours etc.

THOMAS GUTHRIE.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W.1.

*Section of Otology*—President, Dr A. Logan Turner. *Hon. Secretaries*, Norman Patterson, F.R.C.S., and F. J. Cleminson, M.Ch. The next Meeting of the Section will be held on Friday, 20th January 1922, at 5 o'clock. Members proposing to show patients or specimens, etc.,



## General Notes

should send notice along with a short written description to the Senior Hon. Secretary, Norman Patterson, F.R.C.S., 16 Devonshire Place, London, W.1., at least twelve days before the Meeting.

*Section of Laryngology*—*President*, Sir William Milligan, M.D. *Hon. Secretaries*, Walter G. Howarth, F.R.C.S., and T. B. Layton, D.S.O., M.S. The next Meeting of the Section will be held on Friday, 3rd February, at 4.45 o'clock. Members intending to show patients or specimens should intimate the same to the Senior Hon. Secretary, Walter G. Howarth, 75 Harley Street, London, W.1., at least twelve days before the Meeting.

The Council has decided to devote the Meeting on 3rd February to a formal discussion upon "The Treatment of Malignant Disease of the Accessory Nasal Sinuses."

\* \* \*

We are indebted to Sir St Clair Thomson for the following letter. M. Delstanche, rue du Congrès 20, Brussels, would be grateful to those of his confrères in this and other countries who could furnish him with notes or references which would assist him in the preparation of his *rapport*.

"MONSIEUR ET CHER CONFRÈRE,—Chargé par la Société belge d'Oto-Rhino-Laryngologie d'un rapport sur les 'Rhinites professionnelles,' je me permets de faire appel à votre obligeance pour me communiquer les documents (observations personnelles ou renseignements bibliographiques) que vous posséder à ce sujet."

A request on similar lines is made by Dr Baldenweck, 83<sup>bis</sup> rue de Courcelles, Paris (XVII.), Dr Jacod, 5 rue Childebert, Lyon, and Dr Moulouguet, 6 rue Marbeuf, Paris (VIII.), who are preparing a *rapport* on Vaccine Therapy for the forthcoming Meeting of "La Société Française d'Oto-Rhino-Laryngologie."

\* \* \*

### BRITISH MEDICAL ASSOCIATION, GLASGOW, 1922.

The ninetieth Annual Meeting of the British Medical Association will be held under the Presidency of Sir William Macewen, F.R.S., from the 25th to the 29th July inclusive. The Sectional Meetings are arranged for the 26th, 27th, and 28th.

\* \* \*

### TENTH INTERNATIONAL CONGRESS OF OTOTOLOGY, PARIS, 1922.

The Congress will be held in Paris from the 19th to the 21st July inclusive. The subscription to the Congress has been fixed at 100 francs (£2). *Secretary-General*—Dr A. Hautant, 28 rue Marbeuf, Paris (VIII).

\* \* \*

The American Laryngological Association will meet under the

## General Notes

Presidency of Dr Harmon Smith at Washington, D.C., on 1st, 2nd and 3rd May, 1922.

The American Otological Society, under the Presidency of Dr H. S. Birkett of Montreal, will meet in Washington, D.C., on 2nd and 3rd May.

These two Societies meet in Washington this year as two of the component parts of the Congress of American Physicians and Surgeons. A cordial invitation has been extended by the American Otological Society to the Section of Otology of the Royal Society of Medicine to take part in the Meeting at Washington.

\* \* \*

The Section of Laryngology and Otology of the American Medical Association under the Presidency of Dr Joseph A. Stucky will meet at St Louis from 22nd to 26th May.

\* \* \*

The *Archives Internationales de Laryngologie, d'Otologie, et de Rhinologie* ceased publication in the fateful days of August 1914. We are pleased to announce that it will make its reappearance in January 1922, under the direction of Dr F. Lemaitre and Dr L. Baldenweck, Oto-rhino-laryngologistes des Hôpitaux de Paris.

The journal will appear monthly, and proposes to maintain its international character. Hence it appeals to the sympathy of the profession not only in France but in other countries. In the preliminary notice which we have just received, it is announced that each copy of the *Archives* will contain:—

- (1) Several original articles of clinical interest.
- (2) A general review of some subject or a clinical lecture.
- (3) Analyses of theses and of new books.
- (4) Summaries of the Transactions of congresses and of all special societies.
- (5) Résumés of all articles appertaining to the specialty appearing in scientific journals.
- (6) News of interest to oto-laryngologists living in France or elsewhere.

The Annual Subscription is 50 francs in France and 60 francs for abroad. Subscriptions should be sent to 120 Avenue Victor Hugo, Paris (XVI.)

We note, with some envy as Editors, that the *Archives* will not be published during the vacation months, August and September.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## THE PATHOLOGICAL AND CLINICAL ASPECTS OF DEAF-MUTISM.

By J. S. FRASER, M.B., F.R.C.S.Ed., Surgeon, Ear and Throat  
Department, Royal Infirmary, Edinburgh.

(Continued from page 38.)

### II.—ACQUIRED OR INFLAMMATORY DEAF-MUTISM.

AS will be seen from the first part of this paper, the pathology of congenital or developmental deaf-mutism is a somewhat complicated subject. Acquired or inflammatory deaf-mutism, on the other hand, is a comparatively simple problem. As Denker, Mygind, and others have pointed out, the pathology of acquired deaf-mutism is the pathology of labyrinthitis occurring in intra-uterine or post-fœtal life. Intra-uterine labyrinthitis is almost certainly of meningitic origin. Post-fœtal labyrinthitis, on the other hand, may be due (1) to traumatism, as in fracture of the cranial base; (2) to otitis media with invasion of the labyrinth through the oval or round windows or through the prominence of the lateral semicircular canal; or, (3) to purulent leptomeningitis with infection of the inner ear either along the fibres of the eighth nerve or along the aqueduct of the cochlea. It must be admitted that, in the absence of a detailed and accurate account of the case history, it may be difficult or impossible to determine by microscopic examination of the ear—many years after the occurrence of deafness—the exact route of infection of the labyrinth. In other words, we cannot in many cases be certain whether the labyrinth was invaded from the middle ear or from the meninges.

## J. S. Fraser

So-called "primary labyrinthitis" has been described by Politzer and others as occurring in cases of mumps and osteomyelitis. The more recent view, however, is that even in these affections the deafness is probably due to meningitic neuro-labyrinthitis.

The second case observed by the writer was one of acquired or inflammatory deaf-mutism. C. S., boy, aged 10 years, was seen at the Royal Infirmary on 5th January 1917. The patient was admitted from the Deaf and Dumb Institution at 54 Henderson Row, Edinburgh. Unfortunately very few details were obtainable. The mother was in prison, and was only seen after the death of the patient. The father was absent in France on active service. The mother herself was rather deaf, and stated that her deafness came on after the birth of her second baby. She suffered from tinnitus. She stated that she had never had any miscarriages, but her fifth pregnancy resulted in the birth of a still-born child. Of her twelve children only the patient was deaf. He had never spoken and had not had otorrhoea as a baby? He was late in learning to walk—two years and eight months. The patient had been in the Deaf and Dumb Institution since the age of 8 years. The mother asserted that the discharge only began just before he went to the Deaf and Dumb School? (*Note*—It is doubtful whether much importance is to be attached to the mother's statements.)

On examination (5th January 1917) the right external meatus was filled with discharge, and, after syringing, an attic perforation was observed, from which some cholesteatoma protruded. The left drumhead was retracted and showed an adherent scar in the posterior superior part. Functional examination was impossible, as we were not able to communicate with the boy. The radical mastoid operation was advised, but as has been explained above, there was difficulty in obtaining permission from the parents. Patient therefore discharged.

*20th June.*—Patient admitted as an urgent case for operation. About 16th June the boy began to be feverish, the temperature rising to 101° or 102° F. each afternoon. A polypus was present in the right external meatus. It was again found that functional examination was almost impossible. When the sounding tuning-fork was placed on the patient's vertex he only nodded his head and smiled. Apparently he did not hear any of the tuning-forks by air conduction on either side, and did not respond to vowels spoken in a loud voice close to his right ear. When the left ear was tested in the same way he only nodded his head. *Vestibular apparatus*—No Rombergism, no spontaneous nystagmus, no fistula symptom; rotation to left and to right produced no nystagmus. The cold caloric test was negative on both sides. The temperature rose to 106° F. at 8 P.M. on the

# Pathological Aspects of Deaf-Mutism

day of admission, but there was no shivering or vomiting. The boy, however, became cyanosed and drowsy. There was apparently slight pain on pressure on the neck.

21st June.—Temperature 101.8° F., pulse 116, at 8 A.M. The Medical Managers of the Infirmary were communicated with and decided that operation should be performed at once in spite of the lack of permission from the parents.

The case has already been recorded as one of fatal intra-cranial complication of chronic middle-ear suppuration (*Journ. Laryngol., Otol., and Rhinol.*, vol. xxxiv., 1919, p. 483, Case 19). At the operation it was found that cerebro-spinal fluid was clear but under tension. The mastoid antrum on the right side contained foul-smelling pus and an extradural perisinus abscess was evacuated. The sinus was found to be clotted for a distance of two inches backwards from the upper knee. The right internal jugular vein was ligatured and it was found that the upper end contained clot. A further resection of the vein was therefore performed. In the subsequent treatment of the case intravenous injections of eusol were tried, but the rigors continued and metastatic abscesses developed in the left lung with empyema. The patient died three weeks after operation.

## *Microscopic Examination of the Right (operated) Ear.*

*Middle-Ear Cleft.*—External to the carotid canal the Eustachian tube is wide and is lined by normal ciliated epithelium, but further back it is practically obliterated as a result of the radical mastoid operation (Fig. 26). The mucosa of the tympanum is thickened and engorged, and infiltrated with small cells. The sinus tympani contains pus (Fig. 27), and is closed externally by a double layer of tissue, the outer surface of which is covered by cholesteatoma. The mucosa of the antrum is greatly thickened. Cholesteatoma is present on the inner wall of the attic. There is marked irregularity and thickening of the bone over the prominence of the lateral canal (Figs. 21 and 22). The footplate and annular ligament of the stapes are normal, and there is no evidence of a former perforation of the oval window (Fig. 25). The mucosa of the round window niche is markedly thickened (Fig. 27).

*Labyrinth.*—(Note—After the first embedding of the specimen in celloidin, it was found that the hollow spaces of the inner ear were not well filled. The evacuation apparatus was therefore employed during the second embedding, with the result that the membranous labyrinth was injured to a certain extent.)

*Cochlea.*—The bony capsule of the cochlea is normal. There is new connective tissue and bone formation in the scala vestibuli, which is practically obliterated (Figs. 23, 24, and 26). Marked new

bone formation is present in the scala tympani of the basal coil, but in the upper coils the scala is practically normal. The cochlear canal is greatly dilated in all coils. Corti's organ is merely a low layer of cells (Fig. 24). The membrana tectoria is very small, and does not reach Corti's organ. The cells of the spiral ganglion are reduced in number, and the bony spiral lamina contains few nerve fibres. The perilymphatic aqueduct is obliterated at the cochlear end (Fig. 27), but patent towards the cranial end.

*Vestibule.*—The endosteum is thickened on the inner surface of the stapes (Fig. 25). The saccule and utricle are greatly dilated, the two together practically filling the vestibule and almost obliterating the perilymph space. The neuro-epithelium of the saccule and utricle is quite degenerated. The ductus endolymphaticus is very wide at its vestibular end and is patent throughout. New bone formation is present in the perilymph space at the point where the scala vestibuli opens into the vestibule (Fig. 26).

*Canals.*—At its convexity and towards the smooth end, the lateral canal is quite obliterated by new bone formation (Figs. 21 and 22). At the ampullary end, however, the lumen of the canal is present. Even here there is some new bone formation from the endosteum. The crista of the canal is markedly atrophied. The condition of the superior and posterior canals is similar to that of the lateral, but the opening of the crus commune into the vestibule is almost free from new bone; the membranous part of the crus commune is dilated (Fig. 26).

*Internal Meatus.*—The vestibular ganglion is well preserved and the nuclei of the cells are clearly seen. The seventh nerve is normal. The stem of the cochlear nerve also appears healthy (Fig. 26). There is little or no sign of meningitis in the internal meatus.

## *Microscopic Examination of the Left (non-operated) Ear.*

*Tympanic Membrane.*—In the posterior part of the drumhead there is a retracted scar (Figs. 31 and 36) which is adherent to the long process of the incus.

*Middle-ear Cleft.*—The Eustachian tube is normal, but the mucosa of the tympanic cavity is thickened. There is mucopurulent exudate present in the sinus tympani (Fig. 36). The cells in the outer wall of the attic show some purulent exudate (Fig. 29). On the inner wall of the antrum the air cells extend almost to the posterior fossa, and their lining membrane is slightly swollen (Fig. 28). On the left side also there is considerable thickening of the bone over the prominence of the lateral canal (Fig. 29). The niche of the oval window is healthy, so that it does not appear as if infection had spread to the labyrinth by this route (Fig. 31). The mucous

# Pathological Aspects of Deaf-Mutism

membrane of the round window is greatly thickened (Fig. 36), and the secondary tympanic membrane is slightly bulged outwards towards the tympanic cavity. The tympanic ossicles, joints, and muscles are normal (Figs. 29, 30, 31, and 36).

*Labyrinth.*—The scala vestibuli is filled up by new formation of connective tissue and bone (Figs. 32, 33, 34, and 35). The cochlear canal is greatly dilated in all coils, and Reissner's membrane is bulged upwards and inwards to such an extent as almost to obliterate the scala vestibuli. Corti's organ is a low mound of undifferentiated cells (Figs. 34 and 35). The membrana tectoria is absent in all coils, but the stria vascularis is fairly well preserved. The spiral ganglion cells are greatly reduced (Figs. 32 and 34), and the cochlear nerve in the modiolus is almost completely atrophied. The upper part of the scala tympani is nearly free from new connective tissue and bone formation. The opening of the perilymphatic space of the vestibule into the scala vestibuli is almost obliterated by new bone formation. The membrane of the round window is thickened (Fig. 37). The cochlear end of the perilymphatic aqueduct is obstructed by new bone formation.

*Vestibule.*—The utricle and saccule are greatly dilated (Fig. 31), but the neuro-epithelium of these structures is fairly well preserved. The ductus endolymphaticus is slightly dilated.

*Canals.*—As on the right side, the convexity of the lateral canal is filled up by new bone formation, but at the ampullary end the endolymphatic space is well seen (Fig. 29). The crista is almost normal in outline, but the epithelium and nerve fibres are atrophied. There is a polypoid structure on the apex of the crista—possibly a deformed cupula. The branch of the vestibular nerve to the lateral canal stains very badly. The superior and posterior canals show much the same conditions as on the right side (Figs. 28, 30, 31, 36, and 38). The crista of the posterior canal is present, but is markedly atrophied (Fig. 36). The cupula is absent. The crus commune also shows some new bone formation.

*Internal Meatus.*—The seventh nerve is normal. The stem of the cochlear nerve appears healthy (Fig. 32), but the cells of the vestibular ganglion do not stain so well as those of the corresponding structure on the right side.

*Remarks.*—The case is undoubtedly one of acquired or inflammatory deaf-mutism resulting from suppurative labyrinthitis. It is not possible to be dogmatic as to the route of infection. The labyrinth may have been invaded on both sides from the middle ear, through the prominence of the lateral canal, though this is unlikely. The windows do not

appear to have been the route of infection. The presence of cholesteatoma on the right side and of the retracted adherent scar on the left side favour the view that the labyrinthitis was secondary to purulent otitis media in early life. Further, the fact that the changes were most marked in the canals, and that in the cochlea they were more pronounced in the scala vestibuli than in the scala tympani, point in the same direction. On the other hand, it must be admitted that meningitic labyrinthitis is a more probable explanation of the condition. Intra-uterine meningitis cannot be excluded in view of the history that the child was late in learning to walk and had never been able to speak. We have, however, seen from the history of the case that reliance cannot be placed on the statements of the boy's mother, who asserted that middle-ear suppuration had only commenced just before admission to the Deaf and Dumb Institution, whereas cholesteatoma was found at operation upon the right ear and a retracted scar on examination of the left drumhead.

#### 1. Deaf-mutism due to Trauma.

Deaf-mutism due to this cause follows fracture of the cranial base, which involves the labyrinth on both sides. (The subject of injury to the labyrinth in fracture of the base has already been dealt with by the writer on two occasions — *Proc. Otol. Section, R.S.M.*, vol. x., 1917, p. 35, and vol. xii., 1919, p. 103; see also *Journ. Laryngol., Rhinol., and Otol.*, vol. xxxii., 1917, pp. 222, 257, and 287; also *ibid.*, vol. xxxvi., 1921, p. 130.) Bezold states that 3 per cent. of cases of acquired deaf-mutism are of traumatic origin. Mygind gives a percentage of 1.4, and Lemcke of 5. Unless the injury to the labyrinth occurs during the first ten years of life, deaf-mutism is not produced. Brun finds that among 470 injuries of the skull only 57 had occurred in this period. Of the 57 children, 13 died. Of the 470 cases only 275 showed fracture of the *base*. Marked hearing disturbance was present on clinical examination in 30 cases, and, in addition, there were 36 patients in whom the line of fracture at the post-mortem ran through the petrous bone. Thus we have a total of 66 cases with injury of the ear.

Bochdalek, in 1842, recorded the case of a child who fell on its head at the age of 2 years and subsequently lost its hearing and speech. The patient died at the age of 12 years, and autopsy showed that the canals were filled up by bone. The



## Pathological Aspects of Deaf-Mutism

vestibule and cochlea appeared normal, but the case was recorded before the days of microscopic examination.

Katz reports the case of a man, aged 50, who at the age of 3 years suffered from a head injury, followed by loss of consciousness for several days. On recovery it was found that the patient was deaf. Microscopic examination showed that the middle ears were intact, but that the hollow spaces of the labyrinth were filled with spongy bone. Bony ankylosis of the stapes was present on the left side, but on the right there were traces of the stapedio-vestibular joint. There was marked atrophy of the nerve structures of the whole labyrinth, while the stem of the eighth nerve was very thin. Broca's convolution was atrophied.

Nager's patient was a man who died at the age of 64 from cancer of the stomach. There was no deaf-mutism in the family. As a child of 4 years he received a severe head injury and, as a result of this, lost his hearing. He was educated in a deaf-mute institution and was mentally alert, though his speech was difficult to understand. At the autopsy the dura was found to be adherent and the frontal lobes atrophied. There was also a yellow softening on the right side between the caudate nucleus and optic thalamus. Marked arteriosclerosis was present. Both eighth nerves were atrophied. Microscopic examination showed the middle ear normal. The labyrinth capsule showed traces of old fracture involving the region of the sacculus and round window. The fracture had apparently been a vertical one at right angles to the long axis of the petrous pyramid. The semi-circular canals were filled up with new bone, and only in the neighbourhood of the ampulla was any lumen to be seen. The perilymphatic space of the vestibule was greatly reduced by new formed bone and connective tissue. The utricule and saccule were dilated. The cochlea showed (*a*) new formed bone and connective tissue in the perilymphatic space; (*b*) great dilatation of the cochlear duct; (*c*) atrophic degeneration of the neuro-epithelium. It is interesting to note that the membrana tectoria in the middle coil was tucked into the internal spiral sulcus and covered with a nucleated membrane, as in cases of congenital deaf-mutism. Elsewhere it was absent. Corti's organ was absent or replaced by a single layer of undifferentiated cells. Only a few shrunken cells of the spiral ganglion remained, while the nerve canals of the modiolus were empty or filled by connective tissue.

**2. Deaf-mutism due to Labyrinthitis following  
Middle-Ear Suppuration.**

Denker states that middle - ear lesions alone do not as a rule produce such severe deafness as to give rise to deaf-mutism. He believes, however, that it is probable that closure of both labyrinth windows may produce deaf-mutism even when the inner ear is intact. Scheibe, Nager, and others have described the destructive changes in the ear produced by scarlatinal otitis media. In most of these a diphtheritic layer was present in the upper air passages. In the worst cases the tympanic ossicles and joints were destroyed and the superficial layers of the tympanic walls necrotic. There was evidence of invasion of the labyrinth through the oval or round windows in several cases. Siebenmann has stated that, in 1904, there were on record only four cases of deaf-mutism due to *scarlatinal otitis media and interna*, i.e., those of Field, Donaldson, Moos, and Mygind. In all, there was great destruction of the middle ear. The drumhead, malleus, incus, and stapes were absent in three of the cases, while cholesteatoma was present. Evidence of caries and necrosis of the bony walls of the middle ear was found in all. In three, the round window niche was closed by new formed bone. In one case the oval window was open, but in the three others the stapes was absent and the window niche closed by new formed bone. Of the three cases in which the labyrinth was examined, chronic suppurative labyrinthitis was found in one, new connective tissue and bone formation in the second, while in the third the hollow spaces of the labyrinth were filled with cholesteatoma, which had apparently passed in through the open oval window. Katz has recorded the case of a boy who suffered from scarlatina and diphtheria, with acute suppurative otitis media on the right side. The left ear appeared normal on otoscopy. The patient died with the clinical signs of meningitis, which was confirmed at the post-mortem. Microscopic examination of the right ear showed destruction of the footplate of the stapes and of the membranous labyrinth. The eighth nerve was embedded in pus. On the left side the mucosa of the middle ear was inflamed, but the labyrinth windows were normal. The inner ear, however, showed necrotic masses in the basal coil of the cochlea and some pus in the upper coils. The left labyrinth in this case had evidently been infected from the meninges, while the meningitis

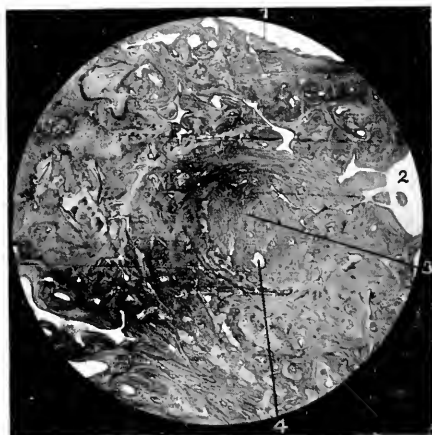


FIG. 21.



FIG. 22.

FIG. 21.—Case II. C. S., male, aged 10 years. Acquired deaf-mutism due to labyrinthitis. Horizontal section through right (operated) ear. No. 70.  $\times 8$  diam. 1. Inner wall of aditus. 2. Mastoid antrum. 3. Convexity of lateral canal almost entirely obliterated by new bone. 4. Remains of endolymphatic space?

FIG. 22.—Case II. Horizontal section through right ear. No. 105.  $\times 11$  diam. 1. Mucosa covering prominence of lateral canal. 2. Lateral canal completely obliterated by bone. 3. Erosion of bone. 4. The ampullary end of superior canals partially filled up by new bone formation.

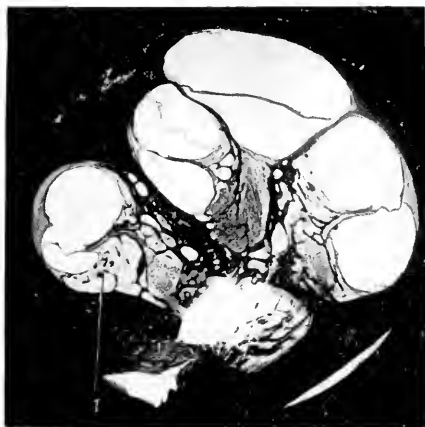


FIG. 23.

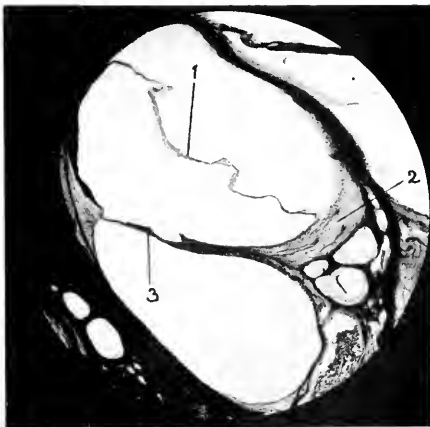


FIG. 24.

FIG. 23.—Case II. Horizontal section through right ear. No. 150.  $\times 11$  diam. The cochlear duct is greatly dilated, almost obliterating the scala vestibuli. Corti's organ is completely absent. The spiral ganglion is somewhat atrophied, especially in the basal coil. 1. New formation of bone and connective tissue in scala tympani of basal coil. (The specimen has been somewhat spoilt by the evacuation apparatus.)

FIG. 24.—Case II. Horizontal section through right ear. No. 150.  $\times 33$  diam. Lower part of middle coil. 1. Reissner's membrane which has been detached by the evacuation apparatus. 2. New connective tissue formation in scala vestibuli. 3. Remains of Corti's organ.

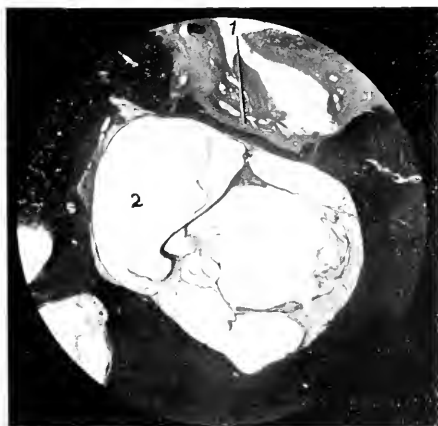


FIG. 25.

FIG. 25.—Case II. Horizontal section through right ear. No. 176.  $\times 11$  diam. 1. Footplate of stapes. 2. Greatly dilated sacculus.

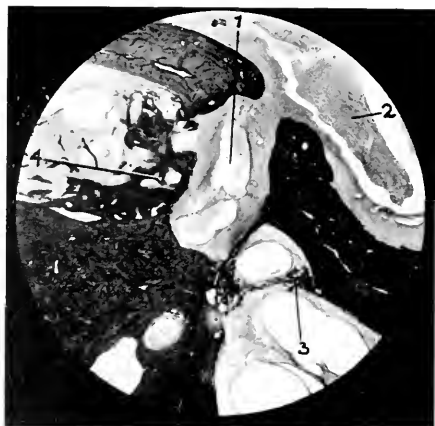


FIG. 27.

FIG. 27.—Case II. Horizontal section through right ear. No. 243.  $\times 11$  diam. 1. Niche of round window with pus cells. 2. Sinus tympani, also full of pus. 3. New bone formation in the lower part of the vestibule. 4. New bone formation in scala tympani on inner side of the thickened round window membrane.



FIG. 26.

FIG. 26.—Case II. Horizontal section through right ear. No. 204.  $\times 5$  diam. 1. Cholesteatoma on inner wall of tympanum. 2. Promontory. 3. Tubal part of tympanic cavity. 4. Internal carotid artery. 5. Upper part of basal coil largely filled up by new bone formation. 6. Internal meatus with nerves. 7. Crus commune. 8. Smooth end of lateral canal filled with connective tissue. 9. Facial nerve.

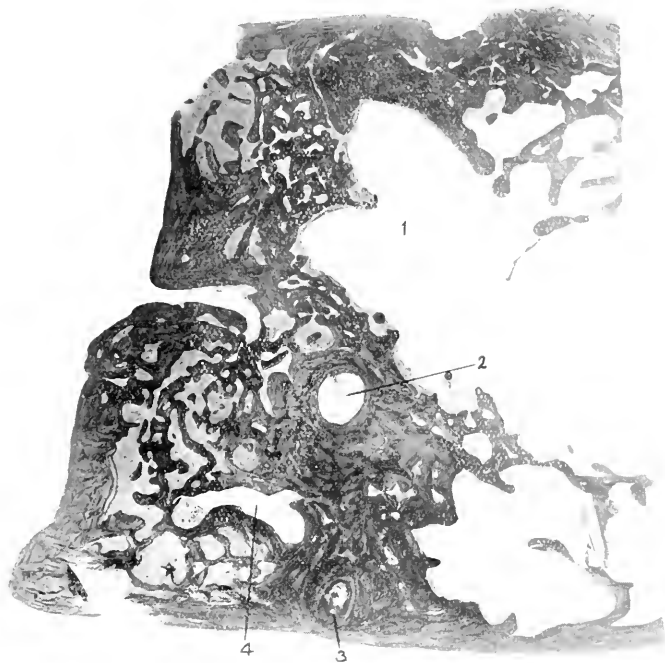


FIG. 28.—Case II. Horizontal section through *left ear*. No. 30.  $\times 5$  diam. 1. Attic. 2. Ampullary end of superior canal partially filled up by new connective tissue and bone. 3. Smooth end of superior canal almost completely obliterated. 4. Fossa subarcuata.

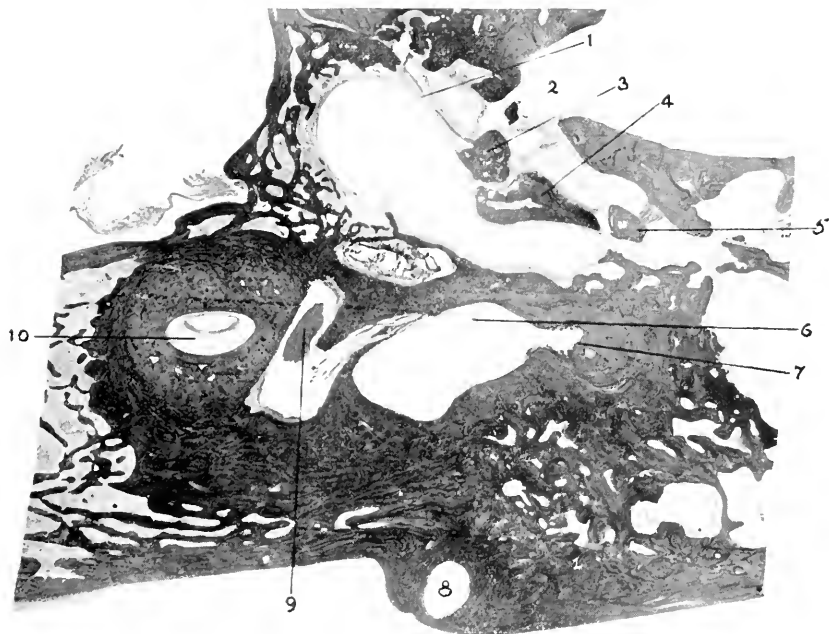


FIG. 29.—Case II. Horizontal section through *left ear*. No. 186.  $\times 5$  diam. 1. Anterior ligament of the malleus. 2. External meatus. 3. Head of malleus. 4. Body of incus. 5. Short process of incus. 6. Atrophic crista of lateral canal and cupula. 7. Convexity of lateral canal obliterated by new bone formation. Note also narrowing of aditus by new bone formation. 8. Smooth end of superior canal. 9. Facial nerve. 10. Upper coil of cochlea.

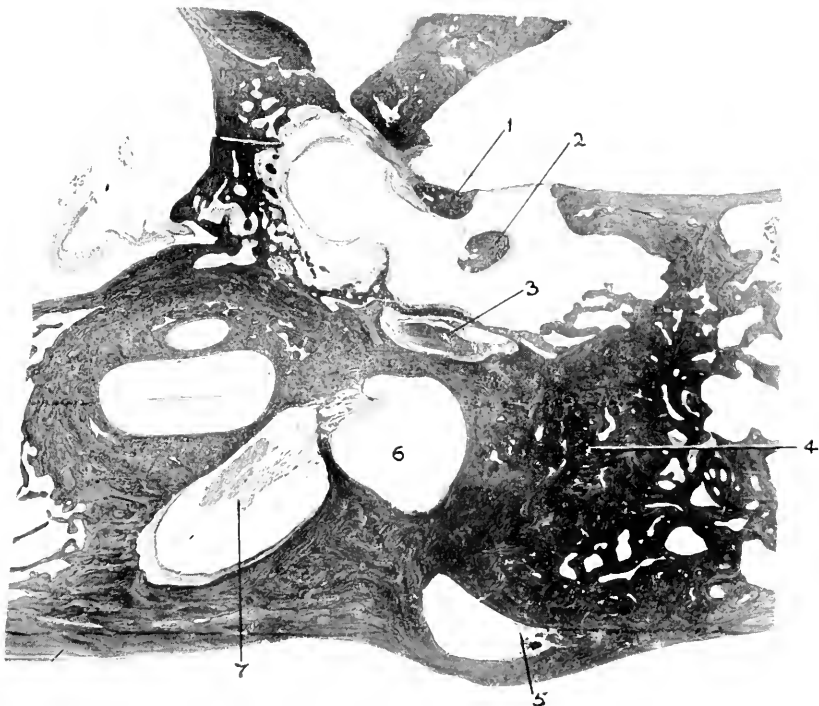


FIG. 30.—Case II. Horizontal section of left ear. No. 256.  $\times 5$  diam. 1. Handle of malleus. 2. Long process of incus. 3. Facial nerve. 4. Note that the lateral canal is completely obliterated in this section. Its position is probably represented by figure 4. 5. Opening of smooth end of posterior canal into crus commune obliterated by new bone formation. 6. Greatly dilated utricle which has almost obliterated the perilymph space of the vestibule. 7. Internal meatus with nerves.



FIG. 31.—Case II. Horizontal section of left ear. No. 287.  $\times 5$  diam. 1. Stapes. 2. Opening of smooth end of lateral canal into vestibule obliterated by new bone. 3. Greatly dilated utricle. 4. Dilated sacculus.



FIG. 32.

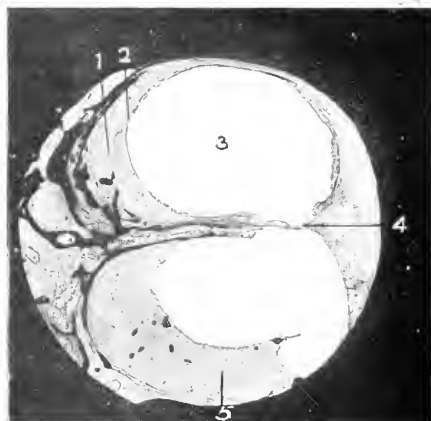


FIG. 33.

FIG. 32.—Case II. Axial section through left cochlea. No. 336.  $\times 11$  diam. Showing new formation of delicate connective tissue and bone in perilymphatic space, and great dilatation of cochlear duct.

FIG. 33.—Case II. Horizontal section through lower part of basal coil, left ear. No. 336. 1. New connective tissue formation in scala vestibuli. 2. Reissner's membrane. 3. Greatly dilated cochlear duct. 4. Rupture of basilar membrane (artefact). 5. New connective tissue and bone formation in scala vestibuli.

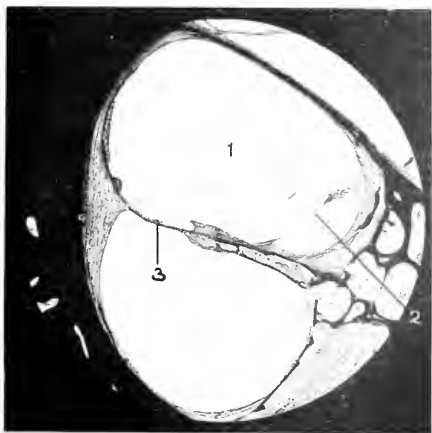


FIG. 34.

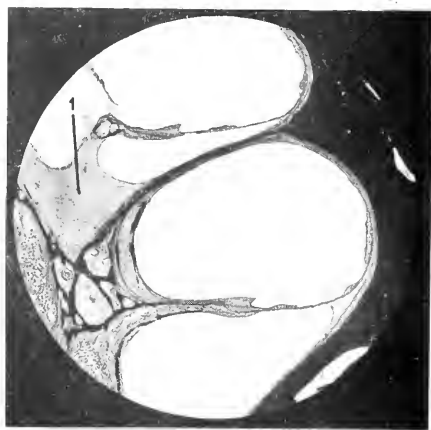


FIG. 35.

FIG. 34.—Case II. Horizontal section through upper part of left basal coil.  $\times 30$  diam. 1. Greatly dilated cochlear duct. 2. Reissner's membrane. 3. Almost complete atrophy of Corti's organ.

FIG. 35.—Case II. Horizontal section through middle and upper coils of left cochlea.  $\times 30$  diam. Shows dilated cochlear duct and atrophic condition of Corti's organ. The membrana tectoria is absent. 1. New connective tissue filling up helicotrema.

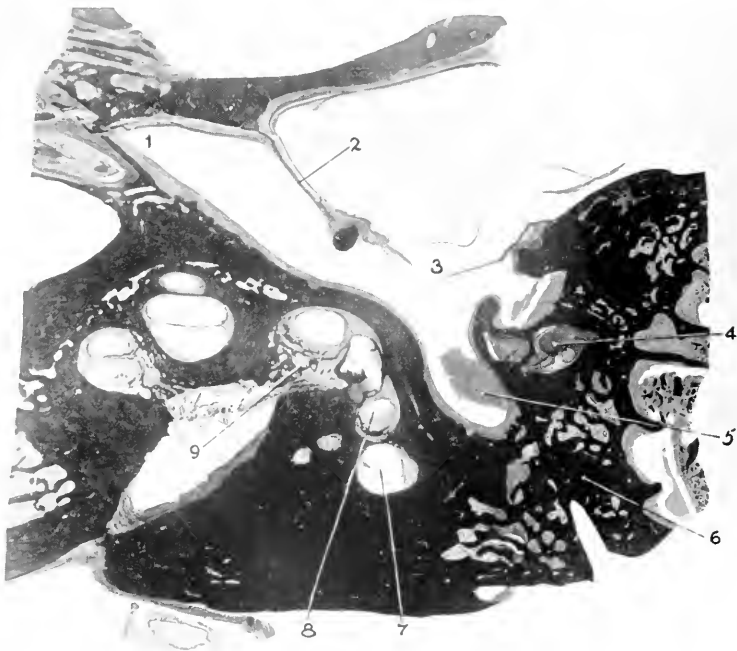


FIG. 36.

FIG. 36.—Case II. Horizontal section through left ear. No. 406.  $\times 5$  diam. 1. Tubal part of tympanic cavity. 2. Anterior part of tympanic membrane, with malleus. 3. Rupture of atrophic posterior portion of drumhead—artefact. 4. Facial nerve with stapedius to the left of it. 5. Pus in sinus tympani. 6. Smooth end of posterior canal completely obliterated by new bone. 7. Ampullary end of posterior canal. 8. Niche of round window. 9. Basal coil of cochlea with new bone formation in scala tympani and scala vestibuli.



FIG. 37.

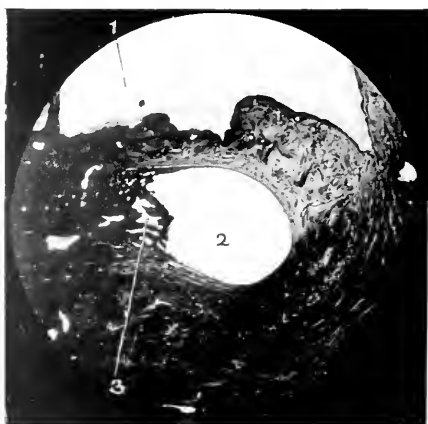


FIG. 38.

FIG. 37.—Case II. Horizontal section through left ear. No. 444.  $\times 10$  diam. Shows round window membrane. 1. Cochlear opening of perilymphatic aqueduct filled up by new bone and connective tissue. 2. Atrophic crista of posterior canal.

FIG. 38.—Case II. Horizontal section through left ear. No. 477.  $\times 10$  diam. Shows posterior canal partially obliterated by new bone formation. 1. Sinus tympani. 2. Ampullary end of posterior canal. 3. New formed bone.



## Pathological Aspects of Deaf-Mutism

itself had resulted from the purulent otitis media and interna on the right side. Two similar cases have been recorded.

Siebenmann states that three cases of *deaf-mutism due to measles* have been macroscopically examined—two by Ibsen-Makeprang and one by Mygind. The post-mortems took place 10, 11, and 26 years after the occurrence of deafness. In all six ears there was much destruction of the drumhead and marked changes in the middle ear and labyrinth. In some there was complete absence of the ossicles, bony closure of the round window and caries of the tympanic walls, and in five of the six cases there was new bone formation in the labyrinth. In Mygind's case the cochlea was filled with bone. Siebenmann holds that in at least three of the temporal bones the labyrinth changes were of tympanic origin. Moos has examined the ears of a boy of three years who developed a unilateral labyrinth affection during measles, and found perforation of the round window membrane and necrosis of the cochlear endosteum. In the lower coil of the cochlea there was new formation of granulation tissue and bone in the perilymph space. Moos and Steinbrügge have recorded a case in which the drumhead and the three ossicles were absent and cholesteatoma present. The vestibule was filled with connective tissue, while the canals and cochlea were replaced by bone. On the left side the cochlea showed distinct, though less marked, evidence of former labyrinthitis, while the membranous structures of the vestibule were not to be recognised.

Denker has put on record the case of a male, aged 16 years. Unfortunately no clinical history was obtained, but the case was apparently one of acquired deaf-mutism due to labyrinthitis of middle-ear origin. The left drumhead showed a scar, and the window niches were filled up by connective tissue. The spiral ganglion cells were considerably reduced in the basal coil. On the right side the stapes was almost completely destroyed. Granulation tissue was present in the round window niche and had invaded the perilymphatic space through the secondary tympanic membrane. Hoelzel's patient was a woman aged 39. The right tympanic cavity was completely filled by scar tissue and new bone. The ossicles were absent and the window niches were also filled up; even the aditus and antrum were obliterated. In the cochlea there was new connective tissue and bone formation, especially in the scala tympani of the basal coil. Very few

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of the spiral ganglion cells remained, their place being taken by connective tissue. Corti's organ was represented by a heap of undifferentiated cells. The vestibule and canals were partly obliterated. A similar case has been reported by Schwabach.

*Tuberculous Disease of the Middle and Inner Ear.*—This subject has already been dealt with by Dr Logan Turner and the writer (*Journ. Laryngol., Rhinol. and Otol.*, vol. xxx., 1915, p. 209), so that it is unnecessary again to go into its pathology and clinical aspect. Siebenmann states that tuberculous middle-ear disease may destroy the bone extensively and yet may finally heal up, with resulting deaf-mutism. He admits, however, that tuberculous otitis media is not very uncommon in deaf-mutes brought up in institutions. It is well known that many of these patients die of tuberculosis. For this reason it is difficult to be sure that the tuberculous disease of the ear found on microscopic examination is the cause of the deaf-mutism. Mygind has examined ten cases—twenty ears. In twelve of these suppuration was present. In all, the ossicles were absent; some showed caries of the tympanic walls, while in others the middle-ear spaces were dilated by cholesteatoma. New bone formation was present in the labyrinth on both sides in six cases, and on one side in one case. The principal point of invasion from the middle ear to the labyrinth was the oval window.

*"Congenital" Syphilitic Deafness.*—The pathology of this condition is still unsettled and requires further investigation. Briefly, there are two views as to the nature of the pathological changes. One group of observers holds that congenital syphilitic deafness is due to syphilitic meningitis and secondary neuro-labyrinthitis. The other view of congenital syphilitic deafness is that it is secondary to otitis media which, in syphilitic children, does not clear up but breaks through the windows or invades the bony capsule of the labyrinth and so reaches the hollow spaces of the inner ear. Moos and Steinbrügge have examined the temporal bones of a deaf-mute who died of phthisis and found marked suppurative otitis media with large perforation of the drumhead and caries of the head of the malleus. The window niches were filled with connective tissue and, on the left side, this tissue was also present in the scala tympani. The membranous cochlea was degenerated. The authors think that the condition was due to syphilis. Steinbrügge alone recorded a further case, in which the

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inflammatory condition had invaded the labyrinth through the oval window. Gradenigo also has recorded a case in which Hutchinson's symptom triad was present. Both labyrinth windows were destroyed. The vestibule and cochlea were partially filled up by new formed bone and connective tissue, and the canals were completely obliterated. The writer has already demonstrated a somewhat similar case and published it in this Journal (Vol. xxxii., 1917, p. 8). It must be admitted, however, that in all these cases the possibility of the condition being tuberculous cannot be excluded. The classical case of Walker Downie has been put forward by the supporters of both views of the pathology of congenital syphilitic deafness in support of their opinion. Those who favour the "meningitic neuro-labyrinthitis" theory hold that the partial obliteration of the hollow spaces of the labyrinth found by Downie resulted from this condition, while the upholders of the "syphilitic otitis media and interna" theory point to the gradual onset of deafness, the opacity and indrawing of the drumheads, and the apparently normal condition of the seventh and eighth nerves as favouring their view.

## 3. Deaf-mutism due to Labyrinthitis following Purulent Meningitis.

Meningitis which gives rise to labyrinthitis and consequent deafness may occur either during intra-uterine or post-fœtal life. Post-fœtal meningitis may be due to various causes, *e.g.*, epidemic cerebro-spinal meningitis, measles, pneumonia, scarlet fever, influenza, etc. The subject of meningitic neuro-labyrinthitis has been dealt with in a paper by Dr J. K. Milne Dickie and the writer (*Proc. Roy. Soc. of Med.*, 1920, xiii., Section of Otol., pp. 23 to 58: abstract in *Journ. Laryngol., Rhinol., and Otol.*, xxxvi., 1921, p. 247).

*Routes of Infection.*—In most cases the infection passes (1) along the eighth nerve in the internal meatus, or (2) along the aqueduct of the cochlea. It is possible, however, that the labyrinthitis is only part of a general systemic infection, and that the involvement may come by way of the blood stream.

Siebenmann has described the pathological changes in the acute stage of meningitic labyrinthitis. The process begins in the perilymphatic space with hyperæmia, stasis, thrombosis, and rupture of the smaller vessels. This is followed by infil-

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tration and necrosis of the endosteum, with swelling and loosening of its endothelial layer. Even the thin plate of endosteal bone may be loosened. The blood supply from the endosteum is cut off, and this leads to necrosis of the sensory epithelium in the cochlea, utricle, saccule, and canals, with curdling of the endolymph. In most cases the eighth nerve at this stage is embedded in pus. On the outer surface of the labyrinth there is fibrinous exudate in the niches of the round and oval windows, and in some cases the annular ligament is eroded. At this stage the labyrinthine fluid is still a blood-stained serum but, later on, it becomes purulent. This is followed by complete destruction of the membranous labyrinth. This stage results in the formation of granulation and connective tissue from the remains of the endosteal layer. Lastly, there is new bone formation in the connective tissue. The base of the cochlea is always more affected than the apex. The membrane of the round window is thickened and ossified, while the footplate of the stapes may be displaced towards the tympanic cavity. The aqueducts are filled up with new bone. The stem of the eighth nerve was found to be atrophic in half the cases examined.

(A) **Intra-uterine Meningitis.**—This condition has already been dealt with to some extent in the first part of this paper. Panse has recorded the case of a female, aged 65. The patient was said to have been born deaf and could hardly speak. The post-mortem showed broncho-pneumonia, atheroma, atrophy of the central convolutions of both hemispheres, softening of the left caudal ganglia, and cyst formation in the right corpus striatum. Histological examination showed the results of an inflammatory infection of the inner ear. The semi-circular canals and cochlea were quite filled up by bone. The eighth nerve was absent in the internal meatus. Panse considers that the case was due to intra-uterine meningitis. Certainly the meningitis must have occurred at a very early age, as the case was regarded as a congenital one. The changes in the inner ear are exactly those one would expect to observe in a healed meningitic neuro-labyrinthitis, and differ markedly from the conditions seen in developmental or congenital deaf-mutism.

Castex and Marchand have recorded three cases of deaf-mutism apparently due to intra-uterine meningitis. In all, the middle ear was intact. There was distinct atrophy of the temporal lobes on both sides. Corti's organ, the cochlear

## Pathological Aspects of Deaf-Mutism

nerve, and the central paths were all degenerated. The facial and vestibular nerves were intact.

Alexander and Neumann have recorded the case of a female, aged 43, said to have been deaf from birth. The eighth nerve was as thin as a thread. External meatus and middle ear normal; cochlear and vestibular ganglia degenerated; atrophy of nerve endings of the labyrinth and of the stria vascularis; absence of the macula of the saccule; dilatation of the cochlear duct of the middle and apical coil; bony closure of the scala tympani at the base of the cochlea; the scala vestibuli was closed off from the perilymph space of the vestibule by bone; a connective tissue mesh was present in the perilymphatic space.

Haike's case was one of encephalitis hæmorrhagica. The infant died on the fourth day after birth. The cranial cavity contained much clear fluid, and the cerebral hemispheres were absent. There were recent hæmorrhages in the eighth nerve and in all coils of the cochlea, especially at the base. Reissner's membrane was ruptured. The spiral canal contained few ganglia cells, and in places was filled with connective tissue. Haike remarks that Lucae and Schwabach had found hæmorrhages in the labyrinth and eighth nerve in cerebro-spinal meningitis, and that Moos had noted several hæmorrhages in a case of pachymeningitis hæmorrhagica.

Schwabach's case (No. 1) was a woman of 57, said to have become deaf in the first year of life. Total deafness was present. The stem of the eighth nerve was normal. There was considerable diminution of the spiral ganglion cells and of the fine nerve fibres. New bone formation was present in the scala tympani and scala vestibuli of the basal coil. The basilar membrane and spiral ligament were absent, at any rate on the right side.

It may be accepted as proved by the case of Gradwohl mentioned in the first part of this paper (p. 35), and by others referred to above that meningitis may occur in the foetus *in utero*. Further, it has been shown that cases of deaf-mute adults—apparently deaf from birth—have been recorded, in which the middle ears were normal and the appearances present in the labyrinth corresponded to those seen in undoubted cases of meningitic labyrinthitis. For obvious reasons it is impossible to prove that the labyrinthitis was caused by *intra-uterine* meningitis. The writer wishes to call attention to the marked difference between the changes observed in these undoubtedly

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meningitic cases and those seen in congenital or developmental deaf-mutism. In the latter, new connective tissue and bone formation are not observed.

(B) **Post-fœtal Meningitis.**—Meningitis is the most frequent cause of acquired deaf-mutism. Siebenmann calls attention to the fact that an almost abortive form of meningitis may lead to severe changes in the inner ear and consequent deafness. Apparently the changes in the inner ear are much the same whatever the cause of meningitis. Mygind points out that in deaf-mutism of meningitic origin there are changes in the labyrinth and relatively slight changes in the middle ear, whereas in deaf-mutism of tympanic origin there are gross changes in the middle ear and only moderate changes in the labyrinth. In meningitic cases Mygind found the most marked changes in the cochlea and canals. In the cochlea the changes in some cases were so marked that the observer might be led to describe the cochlea as absent. When the obliteration was partial it affected the basal parts more than the apex. The nerve tissue in the modiolus showed degeneration in about half the cases. The aqueduct of the cochlea was frequently more or less obliterated by fibrous tissue or bone. In the vestibule the changes were more marked in the saccule than in the utricle. The aqueduct of the vestibule was frequently obliterated. On the whole, however, the vestibule was the portion of the labyrinth least affected. In the semicircular canals the change consisted in partial or total obliteration of the interior by bone.

Siebenmann has collected the results of fourteen post-mortems in cases of meningitic deaf-mutism, *i.e.*, twenty-eight ears. In eleven of these there was ankylosis of the stapes, and in eight bony closure of the round window. These conditions, however, were the result of the meningitic labyrinthitis and not of a middle-ear affection. The stem of the eighth nerve was atrophied in eleven.

According to Habermann, investigation of the central nervous system in cases of meningitic deafness has shown chronic internal hydrocephalus.

Schwabach's case was a female, aged 15 years, who became deaf at the age of 7 years as a result of an illness associated with fever, headache, and vomiting. Deafness occurred on the third day of the illness, and was accompanied by noises in the ear. The patient suffered from a disturbance of gait after recovery. Otoscopy showed thickening of both drumheads and a small

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scar in the right one. The patient was completely deaf. Microscopic examination showed that the cochlea was almost completely filled by new formed bone. The spiral ganglion cells were diminished and the fine nerve branches absent. Corti's organ was completely absent, but there were traces of the spiral ligament and stria vascularis. The whole vestibule was obliterated on both sides. The canals and the aqueducts were almost completely filled up. Schwabach thinks that the infection of the labyrinth had come from the subarachnoid space, by way of the aqueduct of the cochlea. He believes that the case had probably been one of the abortive form of cerebro-spinal meningitis. Scheibe has recorded a similar case in a boy of 8, who became deaf at 4 years as a result of brain disease.

Denker's patient was a woman of 31, who became deaf at the age of 8 years, as a result of cerebro-spinal meningitis. There were no changes in the stem of the eighth nerve; even the spiral ganglion was well preserved. The scalæ were narrowed by new bone formation. The cochlear duct was greatly dilated and Corti's organ absent. The opening of the aqueduct of the cochlea was filled up by new connective tissue and the niche of the round window narrowed by bony masses.

Stein reports the case of a man, aged 32, who had heard well till the age of 3, when he had a severe illness accompanied by loss of consciousness. Afterwards he lost his hearing for speech, but giddiness was not noted. Six of his brothers and sisters had died in the first few years of life and, further, the patient's mother had had four premature births. Autopsy revealed what appeared to be evidence of former meningitis, *e.g.*, granulations in the third and fourth ventricles. Microscopic examination of the ears showed bilateral purulent otitis media, with some erosion of the ossicles, but Stein maintains that there had been no spread of otitis media to the labyrinth. On the left side, there was new formed bone and connective tissue in the scala tympani of the cochlea, and also on the inner surface of the footplate of the stapes. Corti's organ was absent in the lower part of the basal coil, but higher up it showed little change. The nerves were apparently normal. On the right side, the condition of the labyrinth resembled that seen in cases of congenital deafness. Corti's organ and the membrana tectoria were almost absent. The cochlear canal itself was much dilated. There was marked

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atrophy of the spiral ganglion and fine nerve fibres. Stein believes that the case was due to meningitis.

### **Meningitic Labyrinthitis due to Measles.**

Reimer observed meningitis in fifteen out of fifty-one autopsies on cases of measles. An interesting instance of deaf-mutism due to measles meningitis is given by Nager. The case was that of a boy who became deaf at the age of 3 years as a result of measles and meningitis. He recovered, but was found to be completely deaf, and was slow in regaining the power of walking—a condition which Nager attributes to the changes in the maculae of the sacculæ and utricle. Examination showed dilatation of the membranous labyrinth, destruction of Corti's organ, atrophy of the spiral ganglion and nerve fibres which were replaced by connective tissue. There was also a connective tissue meshwork in both scalae and bony closure of the opening of the cochlear aqueduct. The vestibule also showed new formation of connective tissue and bone.

### **Meningitic Labyrinthitis due to Scarlet Fever.**

Siebenmann remarks that in many cases of post-scarlatinal deaf-mutism the drumheads are normal. Hartmann indeed finds them normal in more than half the cases. Further, some of the patients show weakness of intellect, just as after other forms of meningitis.

A case of scarlatinal meningitis and labyrinthitis is recorded by Uchermann. The patient, during an attack of scarlet fever, suffered for five weeks from delirium and drowsiness. The ossicles and window niches were quite intact. The labyrinth on both sides showed filling up of the hollow spaces by new formed bone. The case, however, is not quite free from objection, as the middle ear on both sides showed evidence of recent tuberculous infection, with multiple perforations of the drumhead, and the patient died of chronic pulmonary and intestinal tuberculosis.

### **Meningitic Labyrinthitis due to "Congenital" Syphilis.**

As has been stated already, one group of observers holds that congenital syphilitic deafness is due to the spread of syphilitic meningitis to the labyrinth along the fibres of the



## Pathological Aspects of Deaf-Mutism

eighth nerve, or the perilymphatic aqueduct. In this connection we may briefly refer to the work of Otto Mayer, who examined the ears of eleven syphilitic infants who died at periods varying from ten minutes to seventeen months after birth. In addition to otitis media Mayer found evidence of inflammatory changes in the pia arachnoid in ten out of the eleven cases. In most there was lymphocytic infiltration along the trunk of the eighth nerve, especially marked at the fundus of the internal meatus. The meningitic changes could be traced to the spiral ganglion, the cells of which showed degeneration, especially in the basal coil. In this region also Corti's organ showed similar changes. Further, there was meningitic infiltration along the aqueduct of the cochlea. Mayer came to the conclusion that "congenital" syphilitic deafness was probably due to an extension of syphilitic meningitis along the acoustic nerve, and that this was followed by secondary degeneration in the ganglion cells and neuro-epithelium of the cochlea.

### **Meningitic Labyrinthitis due to Osteomyelitis and Mumps.**

Bilateral deafness as a result of osteomyelitis has been observed by Steinbrügge, Bezold, Wagenhäuser, and Siebenmann. Steinbrügge examined his case and found the bone sclerotic and the membranous labyrinth for the most part destroyed. The lumen of the scala tympani and scala vestibuli was partially filled up by new connective tissue and bone. The changes were most marked at the base of the cochlea. The canals were also narrowed in a similar way, and on one side the round window membrane was ossified. The eighth nerve was replaced for the most part by connective tissue. From the above, it will be seen that the appearances described correspond to those observed in healed cases of meningitic neuro-labyrinthitis. Siebenmann states that the pathology of deafness after mumps is the same as that described above.

### **Deaf-mutism due to Purpura Hæmorrhagica.**

Citelli records the case of a child of two years who suffered from sudden fever, with hæmorrhagic spots over the whole body. Marked cerebro-spinal symptoms were also present, such as paresis of the right side and coma. After recovery the child was totally deaf and the gait was abnormal. Citelli thought that deaf-mutism was probably due to hæmorrhage into the labyrinth.

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## 4. Doubtful Cases.

Several observers have recorded cases of deaf-mutism concerning the classification of which they are doubtful, even after microscopic examination of the inner ears. It is not to be wondered at, therefore, that the clinician is still more uncertain as to the proper classification of some of his cases, as he is frequently given a very faulty history and has the greatest difficulty in carrying out the functional examination, *e.g.*, in the case of a child who may have no means of communication with the outside world. Only one of these doubtful cases appears to be congenital. The rest are almost certainly examples of spontaneous cure of labyrinthitis, and are therefore acquired: the path of infection, however, was not cleared up. (The case just recorded in this paper comes into this doubtful group.)

Panse's case was probably congenital as there were no appearances of inflammation and the patient's brother was deaf from youth. Politzer's case was probably of inflammatory origin, and therefore acquired according to our classification. Linck's case showed on both sides complete filling of the scala tympani and narrowing of the scala vestibuli in the basal coil by connective tissue and new bone; degeneration of Corti's organ, stria vascularis, and spiral ligament; atrophy of nerve ganglion apparatus. This case also appears to have been one of acquired deaf-mutism. Denker's case was that of a male, aged 25. No clinical history was obtained. There were evidences of long standing inflammatory changes in the tympanum. The round window niche was filled up by bone and the niche of the oval window narrowed. The normal bone of the labyrinth capsule was replaced by new formed osteoid tissue which, in places, projected into the lumen of the cochlea, vestibule, and canals. The spiral ganglion was atrophied, but the stem of the eighth nerve was normal. The vestibular nerve was destroyed by bony masses. Denker recorded the case as one of acquired deaf-mutism due to labyrinthitis, but could not be sure whether this had followed purulent otitis media or meningitis.

Alexander and Neumann have recorded the case of a male, aged 53, apparently deaf from birth. The dura, pia arachnoid and vessels of brain were thickened, and the temporal and frontal convolutions atrophied. The tympanum was filled by hard, blackish-red masses in which the malleus and incus could not be found. The eighth nerve was atrophic. On

## Pathological Aspects of Deaf-Mutism

microscopic examination, Alexander and Neumann found filling up of the tympanic cavity and antrum by very vascular bone; total absence of the malleus, incus, and drumhead; rudimentary development of the stapes and of the external meatus; new bone formation in the perilymph space and new connective tissue and bone formation at the base of the cochlea, with closure of the scala tympani; bony closure of the aqueduct of the cochlea; dilatation or collapse of the cochlear canal; total absence of Corti's organ and stria; disappearance of the nerve cells of the utricle and of the three cristæ; absence of the macula of the saccule; saccus endolymphaticus partially closed; utriculus dilated; atrophy of the vestibular nerves and of the spiral ganglion and cochlear nerve. According to the history, the case was one of congenital deafness. The authors look upon the case as due to disturbance of development in which the middle ear was specially concerned. The condition of the labyrinth resembles that seen after purulent otitis media, meningitis, and syphilis.

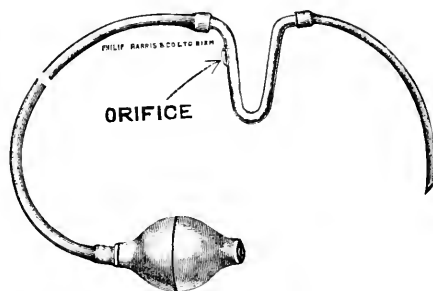
Under the title of Chronic Ossifying Labyrinthitis, Alexander describes a peculiar type of acquired deaf-mutism in a female, aged 71 years. The patient was blind and deaf-mute. Marked arterio-sclerosis was noted at the post-mortem and, in addition, there was atrophy of both optic nerves. The middle ears were normal. Further, the central portion of the eighth nerves and their nuclei were healthy. The distal portion of the eighth nerve on the right side was very thin, and the spiral ganglia and fine nerve twigs were markedly atrophied and their places occupied by connective tissue. At the point where the scala vestibuli opens into the vestibule, there was a mass of new bone which greatly narrowed the communication. The pars superior of the membranous labyrinth was normal in outline but the hair cells had perished. In the cochlea traces of a normal stria vascularis were present only in the upper part of the first coil. Corti's organ was degenerated. The helicotrema was closed. On the left side there was degenerative atrophy of nerve endings in the labyrinth and, in addition, there was circumscribed thickening and ossification of Reissner's membrane. Alexander was of opinion that the condition had occurred during childhood and might possibly have been due to syphilis. The post-mortem showed no traces of previous meningitis.

*(To be concluded.)*

## AN AUTO-INJECTOR FOR INTRA-LARYNGEAL AND TRACHEAL MEDICATED OILS.

By B. SEYMOUR JONES, Hon. Surgeon, Ear and Throat  
Hospital, Birmingham.

THE great value of intra-laryngeal injection of medicated oils in cases of tubercular laryngitis has been long recognised by laryngologists. Oils such as mentholated paroline, chloretone inhalant, etc., serve the purpose of allaying cough by their demulcent and slight anæsthetic action, and they thereby aid in providing the prescribed and desired rest of the crico-arytenoid joints and true and false vocal cords which furthers a cure. By coating the surface of the laryngeal mucous membrane adherent oily antiseptics tend to prevent fresh tubercular infection of the mucous glands and the slight



epithelial abrasions caused by coughing. Finally, they are of use in inhibiting the secondary surface sepsis which aggravates and encourages the advance of infection.

The usual practice is to give an injection twice a week with a curved glass laryngeal syringe (sterilisable). This little operation requires very expert and dexterous usage of the implement, and during a heavy out-patient morning it is by no means certain that every well-intentioned injection reaches its goal.

The following text describes an instrument by means of which the patient can inject his own larynx and trachea with a definite quantity of warmed, slightly antiseptic and anæsthetic liquid paraffin.

The apparatus, made by Messrs Philip Harris & Co., Edmund Street, Birmingham, consists of a metal tube shaped like a **U** of about a quarter of an inch bore and two and three quarter

## Auto-Injector for Medicated Oils

inches in depth from the bend of the **U** to the top. The ends of the tube are bent at a right angle to the arms. To one end a special rubber catheter is fixed and to the other a rubber ball and tube is attached by a screw joint. A small valve is enclosed in this to prevent regurgitation of the oil.

The woodcut illustrates the assembled apparatus. At the back of the arm to which the ball and tube are attached and near the rectangular bend is an orifice, through which the oil is introduced into the bend of the tube. A small glass pipette is used for the purpose.

*Description of the Use of the Instrument.*—Introduce a certain quantity, one pipette full, not more, of the medicated oil through the opening into the tube, the rubber ball and tube being previously detached until later. Warm the bend of the **U**-tube with the contained oil in a cup of hot water. Smear some oil over the catheter with the pipette and pass it through the wider side of the nose, along the floor, until only  $1\frac{1}{2}$  to 2 inches are left outside. The distal end should then hang  $1\frac{1}{2}$  to 2 inches below the margin of the soft palate just above the larynx.

The rubber bulb with the connecting tube is now attached to the screw joint of the **U**-tube. The limb of the tube with the oil hole in it is then held between the forefinger and thumb of the left hand, with the forefinger applied tightly over the vent to prevent the escape of air. (If the surgeon is undertaking the injection, the thumb of his left hand is applied to the oil aperture.)

The patient should now connect up the bulb attachment and then take a slow, deep inspiration. During this effort he should squeeze the bulb sharply three or four times. This squirts the oil into the larynx and the upper part of the trachea. The fact that it does so may be verified by a laryngoscopic mirror when the cords will be seen glistening with a film of oil.

The medicated oil which I have experimented with and found most suitable is chloretone inhalant (Parke, Davis & Co.). It combines antiseptic properties with a slight anæsthetic action in a liquid paraffin vehicle.

It is desirable that patients supplied with the apparatus should be examined by one competent in the use of a nasal speculum, with the object of ascertaining the wider nasal passage, and also of ensuring that the rubber catheter does not double up in the upper channels of the nose—it should always appear below the palate. On demonstrating its use to a patient for the first time, it is recommended that the nasal passage selected and the pharynx and uvula should be sprayed

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with cocain hydrochloride 15 per cent., to which a few drops of adrenalin chloride are added.

The patient should be meticulously instructed in the aim and use of the instrument and the sensation experienced when properly employed, and he should be advised not to abuse it; a week later he should be seen again and his errors in technic amended. Naturally, some patients are more "facile" in its use than others, but the obtuse should be encouraged to persist.

The author's practice is to order an injection once a day, but no ill effect, bronchial or dyspeptic, apparently arises if it is given twice a day. Later experience has disclosed that nausea may be occasioned in a few cases. It is recommended, therefore, that immediately after the injection the patient should gargle the back of the throat with 5 per cent. sod. bicarb. and borax in water coloured with carmine and flavoured with aniseed and peppermint. This removes the oil and prevents nausea. One hospital patient, fired with enthusiasm for the apparatus, and deriving considerable benefit in the relief of cough and diminution of expectoration, gave himself an injection three times a day for three weeks without experiencing any disability. Should the patient contract a common cold, he is warned to intermit the injection for its duration.

A number of cases of tubercular laryngitis, both hospital and private, have been supplied with the instrument and kept under observation. The conclusions arrived at are formulated in the following statements:—

(a) *That there is a diminution of cough.* Patients state that they only cough once a day, in the morning, after the use of the instrument for a week or two.

(b) *That there is a diminution of expectoration.* This is probably due to inhibition of secondary septic processes in the lung, the discharge from which must irritate the lung tissues and cause increased secretion.

(c) *That it disinfects the sputum* and prevents further invasions of laryngeal tissues by protecting them with a film of antiseptic oil. Hence it may be useful in this connection after operative measures on the larynx. (May it not also aid in preventing propagation of the disease by the thoughtless by the disinfection of the sputum before expectoration?)

(d) *That it alleviates pain* in advanced cases with ulceration of the epiglottis and surface of the ary-epiglottic folds.

(e) *That the patient feels that something is being actively done*

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*for him* in which he can play a personal part—this engenders fresh hope and interest.

*Other Uses of the Instrument.*—The instrument has given great satisfaction in cases of atrophic laryngitis associated with atrophic rhinitis. The huskiness and voice fatigue due to the inspissated secretion on the altered and attenuated cords are rapidly relieved by a daily injection of one-quarter of a pipetteful of the inhalant. The necessity for continuing the injection for any length of time does not obtain, as these patients seem to have periods in which their voice gives no trouble.

Very dry weather or the recovery from a common cold with resultant hypersecretion of viscid mucus may induce fresh huskiness and necessitate another course of injections. Obstinate cases of laryngitis sicca after acute inflammation of the cords, perpetuated by occupation in an irritating atmosphere, have been treated with gratifying success. The following example may be quoted:—

The manager of a chemical works had an attack of laryngitis after a severe cold with consecutive hoarseness. His duties obliged him to return to work after a week's absence. Treatment for a month with inhalation of tincture of benzoin and internal medication with ammonium chloride proved abortive, and he was referred to the author. The cords on examination appeared dark red, engorged and thickened, with small black flecks of dried mucus on them. He was advised to use the auto-injector with chloretone inhalant twice daily, and within a week he could talk perfectly again in spite of the obligation to attend to his business amid acid fumes.

The instrument may also be conveniently used for insufflating powder in dysphagia due to tubercular lesions of the epiglottis.

# COMPLICATIONS FOLLOWING REMOVAL OF THE TONSILS: A REVIEW OF 14,960 CASES OPERATED UPON IN THE EAR AND THROAT DEPARTMENT OF THE ROYAL INFIRMARY, EDINBURGH.\*

By G. EWART MARTIN, F.R.C.S.E., Assistant Surgeon, Ear and  
Throat Department, Royal Infirmary, Edinburgh.

RECENT correspondence in the *British Medical Journal* regarding the performance of operations upon tonsils and adenoids in the out-patient clinics of our hospitals and the relative risks incurred by patients treated either as indoor or outdoor cases, has led me to investigate the immediate results of such operations, with the object of testing some of the statements which the correspondence has disclosed. Through the kindness of Dr A. Logan Turner and Dr J. S. Fraser, I have been able to study the case records of all the patients so operated upon in the Ear and Throat Department of the Edinburgh Royal Infirmary from 1914 to 1920 inclusive.

In 1913, a somewhat similar investigation was carried out by Dr J. K. Milne Dickie, who utilised the material in the same department covering a period of seven years, from 1907 to 1913. The results of his research were published, in 1914, in the *Journal of Laryngology*.

The observations made by him were based upon a study of 7133 tonsil operations, in most of which adenoids were removed at the same time. In the majority of the cases the guillotine was used; in the earlier cases of Dr Dickie's series the older operation of tonsillotomy was practised, but subsequently guillotine enucleation was the method adopted. Chloride of ethyl was the anæsthetic employed, save in those cases in which dissection of the tonsils with scissors and snare was carried out, as a rule, under local anæsthesia.

Between 1914 and 1920, 7827 operations were performed. Of these 7575 were treated with the guillotine, according to the Sluder-Whillis-Pybus method, ethyl chloride being used to produce general anæsthesia. In the remaining 252 cases the tonsils were dissected out, and in the great majority of

\* Reports for the year 1921, from the Ear and Throat Department of the Royal Infirmary, Edinburgh, under the care of A. Logan Turner, M.D., F.R.C.S.E.



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cases a local anæsthetic was employed. I have thus been able to review 14,960 cases.

Owing to the want of sufficient accommodation, it is impossible to treat all the patients in the wards; consequently, children living in the city, or in close proximity to it, were operated upon in the morning, and four or five hours later, provided that their condition was satisfactory, they were sent home in cabs or taxis. Parents or guardians were given full printed instructions as to the preparation of the case before operation and the conduct of the case after operation, a request being made that the child should be brought back to hospital seven days after operation. Patients living outside "cab distance" were treated in the ward, being detained from three to five days as the case might be. The cases in which dissection was carried out under local anæsthesia were treated as in-patients for a few days following operation. Of the 7575 cases operated on with the guillotine 2524 were detained as in-patients, and 5051 were treated as out-patients.

The complications which were investigated are considered under the following heads:—(1) Post-operative fatalities; (2) Hæmorrhage; (3) Ear complications.

It is obvious that in attempting to make a comparison between the cases sent home and those detained in hospital for a few days, there is room for a considerable margin of error. Notwithstanding the request to the out-patients that they should report in seven days, the majority failed to do so. Consequently their case records contain no reference as to their condition during the days immediately following operation. If any complication had arisen during the post-operative period, it must be assumed that the practitioner had been asked to attend to the case, but no report regarding this reached the hospital. That complications do arise from time to time is known, as information has been received occasionally by members of the staff that hæmorrhage had occurred, or that one of the cases operated on had developed bronchitis. In connection with the in-patients, on the other hand, the immediate result of the operation can be studied with much greater care and accuracy.

(1) *Post-operative Fatalities*.—During the years 1907 to 1920—the period covered by the investigations of Dr Milne Dickie and the writer—there have been 14,960 operations for the removal of tonsils and adenoids. Six deaths occurred amongst in-patients. Of these two were reported by Dr Milne Dickie,

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and the remaining four, occurring in the period 1914 to 1920, are recorded here for the first time. In no case was death due to hæmorrhage. Ethyl chloride was the anæsthetic used in each case.

A brief synopsis of the six fatalities may be given:—

1. M. B., girl, aged 6: Tonsillotomy and removal of adenoids, 11th July 1910. On the following day she vomited several times; her pulse in the evening was 164, temperature  $97.8^{\circ}$  F., and respirations 30. The breath had a sweet, fruity odour; there was acetone in the urine. Vomiting persisted till the morning of the 18th, when the patient died. *Post-mortem*—Acute fatty changes were seen in all the organs. Probable cause of death was delayed anæsthetic poisoning (Dr Milne Dickie's report).

2. J. B., girl, aged 7: Tonsils enucleated with the guillotine on 14th May 1913. On the 15th she was fairly well, but vomited a little when the throat was painted. Temperature rose to  $100.2^{\circ}$  F. in the evening; she did not sleep well. About 6.20 on the morning of the 16th, the nurse noticed that the patient was cold and dusky, and that the pulse could not be felt. Pupils were dilated, the tongue dry, and the throat clean. No hæmorrhage had occurred. The child died at 7.10 A.M. No *post-mortem* was obtained. The probable cause of death was status lymphaticus (Dr Milne Dickie's report).

3. R. B., boy, aged 11 months, had operation for removal of tonsils and adenoids, 1st May 1915. Child apparently remained well until the night of 10th May, when the temperature went up to  $102^{\circ}$  F., and he gave an indication of tenderness in the right leg. No report on throat condition is noted, and the child was transferred to a surgical ward, where he died on the 16th May. No *post-mortem* obtained. Death was regarded as due to septic absorption.

4. L. F., girl, aged 4: Operation for removal of tonsils and adenoids, 19th May 1917. No trouble with anæsthesia at operation: no hæmorrhage. At 3 P.M. on the same afternoon the condition of status epilepticus developed and continued until death early on 20th May. *Post-mortem*—a general hyperplasia of lymphoid tissue. Tuberculosis of lymphatic and bronchial glands. Broncho-pneumonia (early). Probable cause of death—Early broncho-pneumonia and status lymphaticus.

5. F. B., boy, aged 6: Operation for removal of tonsils and adenoids on 4th July 1917. The child was very restless all night after the operation, and on the following day (5th July), temperature was  $101.6^{\circ}$ , pulse 104, respiration 26. He became rapidly worse during the day. Respirations numbered 48. The child died at 8.5 P.M., 5th July. No *post-mortem* was obtained. The probable cause of death was septic absorption and broncho-pneumonia.

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6. B. P., girl, aged 7 months: Operation for removal of adenoids on 18th January 1919. The child remained well until the following day (19th), when the temperature rose. Respirations became very quick in the evening. Death occurred suddenly on the night of the 19th. *Post-mortem*—Patchy broncho-pneumonia and emphysema of the lungs. Probable cause of death was broncho-pneumonia.

Of the six fatalities, one was the result of delayed anæsthetic poisoning, and one, in the absence of a post-mortem, was ascribed to status lymphaticus. In the remaining four, death resulted from sepsis, a broncho-pneumonia being present in three, associated in one with a hyperplasia of the lymphoid tissue (status lymphaticus). In none of these cases did hæmorrhage play any part in bringing about the fatal termination.

In connection with the administration of the anæsthetic, in one case a severe spasm of the glottis necessitated the immediate performance of tracheotomy. With this exception, however, no other untoward event occurred in connection with the use of ethyl chloride.

Three of the children operated upon developed bronchitis while still under observation in the ward.

(2) *Hæmorrhage*.—Hæmorrhage will be considered under three heads:—(a) Primary, *i.e.* immediate or operative; (b) Reactionary, *i.e.* hæmorrhage recurring within a short time of the operation; (c) Secondary, *i.e.* within a few days of operation.

In the series 1914-1921, where the guillotine enucleation was performed, two cases of primary and reactionary hæmorrhage and four cases of secondary hæmorrhage are reported. Both cases of reactionary hæmorrhage were in-patients, and in neither case was the bleeding severe.

1. J. B., female, aged 27: Operation for removal of tonsils and adenoids, 10/5/16. A good deal of hæmorrhage occurred at the time of the operation, recurring for some hours afterwards. Peroxide of hydrogen gargles were used frequently. On the following day no further bleeding occurred, and the patient went home on the 12/5/16.

Reported again on 11/6/16, throat healthy.

2. A. B., female, aged 22: Operation for removal of tonsils and adenoids, 16/3/14. Considerable bleeding took place at the time of the operation, and it recurred in the ward afterwards. Treatment with hydrogen peroxide sufficed to control it. She reported again on 24/3/14. The throat was healthy, but a moderate portion of the right tonsil had not been removed at the operation.

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It must be noted, however, that, from time to time, an out-patient case has been detained in the recovery room after operation beyond the ordinary period on account of slight recurring hæmorrhage, but no account of this has been entered on the case sheets.

The four cases in which secondary hæmorrhage is reported were out-patients, and in no case was bleeding severe.

1. M. A., female, aged 17: Operation 3/2/15. Reported 12/2/15. Considerable bleeding occurred five days after operation, with vomiting of blood. On examination it was found that neither tonsil had been completely removed.

2. A. M., male, aged 16: Operation 14/12/17. Reported 18/12/17. He complained of bleeding on the previous evening. A small clot was present in the right tonsillar fossa; otherwise the throat was clean and bleeding had ceased.

3. G. M., male, aged 27: Operation 20.5/18. Reported 6/6/18. He stated that some bleeding had occurred ten days after the operation. The throat was healed.

4. E. S., male, aged 4: Operation 9/1/19. Reported 17/1/19. Child looked very pale. The report was that he vomited a fair amount of dark blood on the previous day. There was a large blood-clot present in the right tonsillar fossa. He reported again on 21/1/19. The throat was clean and the patient looked very much better.

In the series of cases analysed by Dr Milne Dickie, two cases of hæmorrhage followed enucleation by the guillotine, one being reactionary and one secondary. There were, however, four cases of hæmorrhage following tonsillotomy, two being reactionary and two secondary. In one of the latter, forceps had to be placed upon a bleeding point and left in position for some time.

During the last ten years, where enucleation of the tonsils by the guillotine has been performed, no case is reported in which hæmorrhage had to be controlled by forceps or clamps.

In analysing, however, the case records of the 252 operations for removal of tonsils with scissors and snare, one finds that five cases of primary hæmorrhage occurred. In four of them the bleeding was slight and easily controlled by sponges soaked in hydrogen peroxide. In the fifth case, forceps failed to entirely control the hæmorrhage, and a clamp had to be put on.

A. F., female, aged 16: Operation 17.7/20, for enucleation of tonsils under a local anæsthetic. One half per cent. novocaine with

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adrenaline was used. Right tonsil was dissected out with scissors. A great deal of hæmorrhage occurred. Two bleeding points were caught with artery forceps, but not ligatured. After removal, a clamp was applied and left on for some time. Left tonsil was not touched. (No notes of the after-condition available.)

No cases of secondary hæmorrhage are reported in this series.

In Dr Milne Dickie's analysis of dissection operations, there were three cases of hæmorrhage, one primary, one reactionary, and one secondary, following enucleation by scissors and snare.

(3) *Ear Complications.*—These may be considered in two main groups: I. Where an attack of acute otitis media, suppurative or non-suppurative, occurred without any previous history of ear trouble. II. Where otitis media developed as an exacerbation in an ear previously the seat of chronic otitis media.

In Group I. acute otitis media developed in 35 of the patients, 2 of whom were in-patients and 33 out-patients. In Group II. otitis media occurred in 12 cases, of which 5 were in-door and 7 out-door cases. When calculated in percentages, the following figures are arrived at:—

<i>Operations on in-patients, 2776.</i>		Per Cent.
Group I. Acute otitis media ( <i>de novo</i> )	2 or	0·07
Group II. „ „ (exacerbation)	5 or	0·18
<i>Operations on out-patients, 5051.</i>		
Group I. Acute otitis media ( <i>de novo</i> )	33 or	0·65
Group II. „ „ (exacerbation)	7 or	0·13

The difference in the number of ear complications among the out-patients and in-patients is very marked, and it may be accounted for by the fact that the child is exposed, not only on the journey but also at home, to unsuitable atmospheric conditions. In this connection it is interesting to note that in 6 cases where there was an ear complication, the operation was in the summer months—June, July, and August. Nine cases occurred in November and 7 in December and January, which are our coldest and dampest months.

In the series of cases between 1907 and 1914, Dr Milne Dickie reported 11 cases of acute suppurative otitis media, but no mention is made as to whether they were in-patients or out-patients.

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## Summary of Complications of the Operations for Removal of Tonsils between 1914 and 1920.

Total number of operations.	7827
Guillotine operations	7575
Enucleation with scissors and snare	252

### *Guillotine operations :—*

#### *In-patient operations, 2524.* Per Cent.

Number of deaths	4 or	·15
Primary and recurring hæmorrhage	2 or	·08
Ear complications	7 or	·27

#### *Out-patient operations, 5051.*

Number of deaths reported	<i>nil</i>	
Primary hæmorrhage reported	<i>nil</i>	
Secondary hæmorrhage reported	4 or	·08
Ear complications	40 or	·81

#### *Dissection operations, 252.*

Primary and reactionary hæmorrhage	5 or	1·98
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## Summary of Complications of the Operations for Removal of Adenoids and Tonsils from 1907-1920.

As Dr Milne Dickie did not differentiate, in his report, between the ear complications in out-patients and in-patients, the complete summary cannot be given with the same detail as the above. The figures are as follows :—

#### *Guillotine and dissection operations, 14,960.* Per Cent.

Deaths	6 or	·04
Primary and recurring hæmorrhage	12 or	·08
Secondary hæmorrhage	8 or	·053
Ear complications	59 or	·397

For the purpose of comparison with operations performed in hospital, Dr J. S. Fraser very kindly put at my disposal the very full records of his private cases, during the years 1911 to 1921, where he performed the guillotine operation or enucleation with scissors and snare.

### *Enucleation by the guillotine :—*

Anæsthetic complications	1 case of pleurisy.
Primary hæmorrhage	·35 per cent.
Secondary hæmorrhage	<i>nil</i>
Ear complications	<i>nil</i>

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In one case of primary hæmorrhage a clamp had to be left on for an hour or two.

*Enucleation with scissors and snare :—*

Slight hæmorrhage . . .	·77 per cent.
Severe primary hæmorrhage . . .	·77 per cent.

In one case only it was found necessary to apply a clamp. In the other cases, sponge pressure was all that was required to stop the bleeding.

*Conclusion.*—Complications attending the operation for removal of the tonsil by the guillotine are comparatively rare, but they may be very grave, and fatal results are not unknown. Six deaths in 15,000 cases during fourteen years is a very small percentage, but still the fact remains that there have been these unfortunate calamities. That three of the deaths were directly due to the anæsthetic shows that the administration of even a short anæsthesia should not be taken too lightly. Hæmorrhage following the guillotine operation is almost negligible, provided no tags of tonsillar tissue are left behind. The patient should not leave the operating table until the surgeon is satisfied that all bleeding has ceased.

Ear complications are not uncommon. The fact that the percentage of out-patients developing an ear complication following on the operation for removal of tonsils compares very unfavourably with that of the in-patient and private cases, would justify us in discouraging operations, at least during the winter months, if hospital beds are not available.

It is interesting to note that of the cases operated on 70 per cent. were under the age of eighteen years, while, roughly, 48 per cent. were of school age.

I desire to express my indebtedness to Dr A. Logan Turner and Dr J. S. Fraser for the opportunity which they have given me of recording the above facts.

## CLINICAL RECORD

### CASE OF SUPPURATION IN A SUB-DIVIDED MAX- ILLARY ANTRUM WITH "NASAL GANGLION NEUROSIS," SUGGESTING MALIGNANT DIS- EASE. (SKIAGRAM). OPERATION. RECOVERY.

By SIR JAMES DUNDAS-GRANT, K.B.E., M.A., M.D.(Edin.), F.R.C.S.,  
Consulting Surgeon, Central London, Throat and Ear Hospital.

A GENTLEMAN, about 50 years of age, came to me in January 1921, complaining of pain in the upper part of the left nasal fossa, dating from December 1919. The facial expression indicated the intensity of his suffering and suggested the physiognomy of *tic convulsif*. He had had numerous teeth removed from the left upper jaw and, on previous occasions, had had the lower part of the septum resected and the anterior half of the left inferior turbinated body removed. The upper part of the septum was still bent to the left, but beyond a general turgescence of the mucous membrane at the back of the middle meatus, there was no sign of disease and only very little muco-purulent secretion ran down into the naso-pharynx. The antrum was translucent on transillumination, and no pus was washed out by means of Lichtwitz's trocar and cannula.

Intense pain was produced by touching the site of an extracted upper molar and the attachment of the anterior edge of the truncated left inferior turbinal, but mainly by probing immediately behind the attachment of the middle turbinal—the position of the sphenopalatine ganglion. Pain extended round the eye to the malar bone—temporo-malar—and as far back as the ear.

Some relief was afforded by nasal suction practised by means of Muck's apparatus, but most of all by the application of cocaine to the spot described behind the middle turbinal. There was thus almost a perfect picture of Sluder's sphenopalatine ganglion neuralgia. Wassermann's reaction was negative, and there was no history of specific disease. There was, therefore, great suspicion of the early development of a malignant neoplasm in the region of the pterygoid fossa. This received support from the X-ray examination of the skull and sinuses by Dr Knox who reported as follows:—

"The left antrum is more opaque than the right. In the lateral and oblique view of the antra the left shows an opaque shadow which appears to arise from the posterior wall; the anterior wall is free and there is a clear space between it and the shadow. The frontal and sphenoidal sinuses appear to be clear" (Figs. 1 and 2.) It only





FIG. 1.

Skiagram showing shadow in left antrum. Front view.

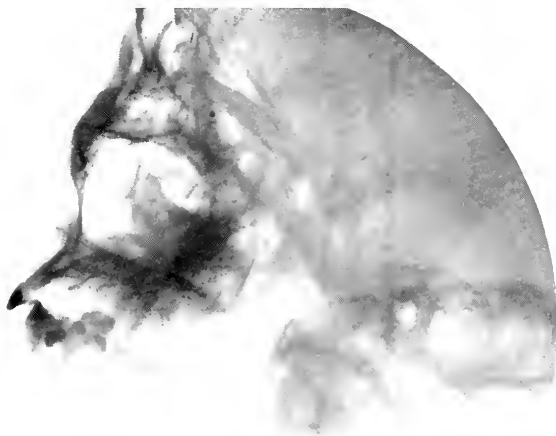


FIG. 2.

Skiagram showing shadow in posterior part only of left antrum. Side view.



## Case of Suppuration in Maxillary Antrum

remained to open the antrum and to be prepared to remove the upper jaw if the possible neoplasm was found.

I therefore operated by Canfield's anterior transnasal method and found the anterior part of the cavity free from pus or new growth. There was, however, a vertical bony partition shutting off the posterior half of the cavity. I was able to break this down with a strong spoon, giving vent to a quantity of broken down granulation-like tissue bathed in pus. It appeared to be simply inflammatory material pent up in a compartment of the antrum. A specimen was referred to a pathologist who reported it as "rich in mucous glands and showing intense infiltration of the superficial tissues by small inflammatory cells. There is no sign of new growth or tubercle."

The convalescence was retarded by a streptococcal infection which yielded to injections of anti-streptococcic serum.

The recovery was complete, and for a time the patient washed out the antrum through the convenient opening afforded by Canfield's nasal modification of Denker's oral operation.

As regards the frequency of the sub-division of the antrum, Zuckerkandl (French edition p. 397, and Figs. 4 and 5, Plate XXVII. of Atlas) states that it is not rare to find the postero-superior region of the sinus separated from the main portion of the antrum by an osseous lamina. Gruber found five cases of sub-division in 200 skulls (a percentage of 2.5); in one, the condition was bilateral; in all of them, both cavities opened into the middle meatus. Zuckerkandl offers as an explanation of the condition that in the embryonic state of the antrum there is formed, in addition to the normal offshoot from the middle meatus, a second, which arises from the inferior ethmoidal cleft. Logan Turner describes a specimen in which a vertical bony partition situated in the interval between the second and third molars almost completely divided the antrum into an anterior and posterior compartment, a small aperture in the septum immediately beneath the roof of the sinus afforded communication between the two sub-divisions (*Accessory Sinuses of the Nose*, p. 12).

# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF LARYNGOLOGY

November 4th, 1921.

*President*—Sir WILLIAM MILLIGAN, M.D.

**Microscopic Specimens from Three Cases of Bleeding Polypus (Discrete Angeioma) of the Nasal Mucous Membrane**  
—THOMAS GUTHRIE, F.R.C.S.—Woman, aged 32. Obstruction of left nostril, one year and eight months; frequent profuse bleeding during last twelve months. The growth the size of a small bean was attached by a narrow pedicle to the mucosa of the outer wall near its junction with the skin of the vestibule. Growth removed and base cauterised; no recurrence.

Woman, aged 45. Obstruction of left nostril and frequent bleeding for nine months; growth the size of a large pea attached by a narrow pedicle to the anterior end of the left inferior turbinal; removed and base cauterised; no recurrence three months later.

Woman, aged 30. Repeated attacks of bleeding from right nostril during past eight or ten months: growth the size of a large bean attached by a narrow pedicle on the septal side of the right middle turbinal. Hanging down between the middle turbinal and the septum, it reached the upper border of the inferior turbinal. It was bright red in colour and had a slightly irregular and granular surface. It bled freely when touched.

Microscopically each growth resembled one or other of the varieties of "bleeding polypus of the septum." Clinically, also, the cases were characteristic of this condition, with the exception of the points of origin of the growths.

The PRESIDENT thought the third case was most suspicious of sarcoma. Mr F. A. ROSE was doubtful of the third specimen, which arose from the middle turbinate, and he advocated further investigation.

Mr GUTHRIE replied that the third specimen was of the cavernous angioma type and it had enormous blood spaces. He did not cauterise its base, and a month later he removed a recurring growth which he cauterised. The middle turbinal was not infiltrated.

**Laryngo-fissure for Early Epithelioma of the Right Vocal Cord**—E. D. D. DAVIS, F.R.C.S.—Male, aged 46, was shown to the Section on 6th May 1921. Both vocal cords were then red and injected, but there was a small pachydermatous excrescence on the superior surface and edge of the right vocal cord. A piece removed for section was insufficient for diagnosis. Epithelioma was then strongly suspected, but doubted by some observers. Six weeks later

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the condition of the cord had slightly progressed, so a laryngo-fissure was performed, and the right vocal cord was excised. The bulk of the growth was below the vocal cord and was not visible by laryngoscopy. The thyroid ala was not removed.

**Epithelioma of the Left Vocal Cord removed by Thyrotomy nearly a Year ago**—Sir JAMES DUNDAS-GRANT, M.D.—Female, aged 52, seen in September 1920, with hoarseness of two years' duration, and with some increasing respiratory difficulty. There was a white "cauliflower" growth on the posterior half of the left vocal cord, which was almost immobile. A portion removed for examination was reported on as epithelioma.

Thyrotomy on 11th November 1920: convalescence was disturbed by a severe attack of bronchitis; she made a slow recovery. She was not seen again until 5th July 1921, when the tracheotomy tube was removed.

There is considerable inflammatory swelling of the left half of the larynx, though this has recently subsided to a considerable extent. There is an irregular thickening of the right vocal cord, the nature of which is doubtful.

**Two Specimens of Advanced Intrinsic Epithelioma of Larynx obtained by Complete Laryngectomy**—E. D. D. DAVIS, F.R.C.S.—1. From male, aged 64, with urgent dyspnoea. The larynx showed an advanced epithelioma of the left vocal cord, necessitating tracheotomy. Later, complete laryngectomy was performed; the patient made an uninterrupted recovery and is present at the Meeting.

2. From a similar case, but the patient died of mediastinitis three days after the laryngectomy. The sepsis is believed to have arisen from the tracheotomy wound made sixteen days before operation. Tracheotomy added to the difficulty in both operations.

The PRESIDENT said that in Mr Davis's case of laryngo-fissure the sentence "the thyroid ala was not removed" was very important. It raised the question whether, in such cases, the ala should be removed or left alone. In connection with the two specimens of advanced intrinsic epithelioma of larynx, complete laryngectomy was performed for disease confined to the left vocal cord. With regard to sepsis having arisen from the tracheotomy performed sixteen days prior to operation, he asked if the trachea was stitched to the skin of the neck, or simply a tracheotomy tube inserted? Concerning Sir James Dundas-Grant's case of epithelioma of the left vocal cord, the question was, what was the condition of the right cord? Was it also malignant? He had a male patient whose left vocal cord he removed six years ago, and who had remained well until a few months ago, when the right cord presented a white, tessellated, pachydermatous appearance, with a little cedema, almost identical with that seen in this case, and it was difficult to decide whether it was early malignancy or pachydermia; also as to whether it was advisable to remove the second cord. If malignant, he would have some diffidence in removing it from a man aged 70, as in many cases the disease advanced very slowly.

Dr W. HILL commented on the extreme rarity of primary endo-laryngeal epithelioma in females; he had never seen a case in his own practice.

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Sir ST CLAIR THOMSON said that when a good projecting portion of growth could not be removed for microscopic examination, it was better to wait and watch the case, forming the diagnosis on the clinical development. The difficulty of viewing the subglottic area by the indirect method would not have been got rid of by the direct method, and he considered a better view was obtained by the former method—by working the mirror sideways. He regretted he had not commenced to remove the thyroid ala earlier in his career. He first did so in 1907, because it was involved by the disease. He commenced to remove it systematically in 1917, and in the subsequent five years he had done so in fifteen cases. Fourteen of these were still alive and free from recurrence. He recommended removal of the ala because it gave more space for the removal of the growth, and it was easier to deal with subglottic extension. It also left a fleshy inner surface to the larynx, and hence quicker healing. He had operated upon patients of 70 and 75, and they were well five years afterwards. He thought there was a little stenosis in Sir James Dundas-Grant's case which might have been avoided if the ala had been removed.

Mr F. A. ROSE said he had removed the thyroid ala ever since Dr Lack recommended it, and he saw no disadvantage in doing so. His experience had been favourable. Generally speaking he was opposed to removing a piece of growth for diagnosis.

Dr W. S. SYME disagreed with Sir St Clair Thomson's faint praise of the direct method: he used it extensively and in most cases found it gave a better view than the indirect. In such a case as that now being discussed, he did not doubt that suspension laryngoscopy would give a complete view even of the anterior part of the subglottic portion. He did not like to hear the removal of a piece for examination condemned. Twice he had opened the larynx for what was regarded as malignant growth, but which proved to be tubercular.

Dr JOBSON HORNE agreed with Mr Rose as to the unreliability of diagnosis by endo-laryngeal removal of a piece of growth. Laryngoscopic examination should be cultivated, in association with other clinical evidence.

Mr WRIGHT said that two years ago he saw a man, aged 60, with a pedunculated growth on his right vocal cord. It looked innocent and he removed it endo-laryngeally, and it was microscopically reported to be a fibroma. Recently a larger pedunculated growth had recurred, and he favoured removal by thyro-fissure, but after consultation with colleagues he again removed it endo-laryngeally, and it proved to be an epithelioma.

Dr IRWIN MOORE referred to the advantage of being able to examine the under surface of the vocal cords in cases of malignant growth, and he said he would show at a later meeting an endo-laryngeal mirror which he had designed on the principle of Michels' post-nasal mirror. It could be passed down an endoscopic tube and the subglottic area viewed.

Mr TILLEY, referring to the treatment of recurrence, advised the new X-ray treatment as advocated by Dr Morton, directed in equal amounts on all parts of the growth. Dr Morton applied the rays to a patient with extensive malignant growth of the larynx which had recurred, when it was a question whether a complete laryngectomy or a palliative tracheotomy should be done. Three months after the X-ray treatment the man appeared without any laryngeal trouble. He recently subjected another patient, aged 71, with a growth below the anterior commissure, to the same treatment. The growth was becoming smaller and the voice much clearer.

Mr E. D. D. DAVIS (in reply) said that in his case of laryngo-fissure the thyroid ala was not removed because there was no apparent necessity to remove it. The advisability of removing pieces of growth for section should be decided in each individual case, and if sufficient tissue could be obtained, this should be done in doubtful cases. In both laryngectomy cases the trachea was very adherent to surrounding structures in the region

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of the tracheotomy wounds, and considerable difficulty was experienced in separating the trachea from the œsophagus. He divided the trachea through the lower edge of the tracheotomy opening, and sloped the incision upwards and backwards. The trachea was then firmly sutured to the skin. In the second case the tracheotomy wound was not quite healed, and he thought this source of sepsis accounted for the subsequent mediastinitis. Dr Morton had treated for him by X-rays a case of recurrence after laryngo-fissure without success.

Sir JAMES DUNDAS-GRANT (in reply) said that he would have liked more opinions as to the condition of the remaining cord in his case; the disease had not extended. In answer to Dr Hill, only three of his laryngo-fissure cases had been females, and all recovered.

**Model showing the Mode in which the Sacculus Ventricularis Laryngis might be inverted by the Negative Pressure caused by Coughing**—S. G. SHATTOCK, F.R.C.S.—Laryngologists must recognise, with anatomists, a laryngeal ventricle and a sacculus. The sacculus has a well-defined oval mouth limited to the external part of the roof of the ventricle; it is distinguished again by the layer of mucous glands in connection with its interior. The researches of Dr Irwin Moore show that there are but three *authenticated* examples of eversion of the sacculus. In Uckermann's case the everted structure, which projected between the ventricular band and vocal cord, was cut away during life, and the abundance of glands with which it was furnished proved that it could have been nothing other than the sacculus. Sir Morell Mackenzie's case is in the Museum at Golden Square, Moxon's is in Guy's Hospital. Mackenzie had cut a window in the thyroid ala on the side on which the eversion was more pronounced (for it was bilateral), and demonstrated the absence of a sacculus from the normal position. Through the courtesy of Mr Davies-Colley, Dr Irwin Moore and I were able to make a further examination of Moxon's specimen. On cutting a window in the thyroid ala no sacculus was found in the proper situation, and the projecting structure in the larynx could be readily returned into position by means of a probe. These two cases have, for the most part, been either ignored or discredited by Continental and American authors, or explained away as examples of the more common condition named "prolapse of the ventricle," which apparently consists of a protrusion of the floor of the ventricle into the air-way, as a result of inflammatory cedema or chronic thickening; and it is to the credit of Dr Irwin Moore that he is reinstating Mackenzie's and Moxon's observations to their right position in laryngological literature.

It is not easy to see, at first, how eversion can be brought about. The view which I venture to submit is that it results from the *negative pressure* set up by violent coughing. The effective closure of the glottis which precedes coughing, takes place at the site of the true cords: any approximation of the ventricular bands can be only a concomitant, seeing that the latter are unprovided with muscle. When

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the glottis is suddenly opened in coughing, the blast of liberated air rushes past the ventricle and orifice of the sacculus; and, if often repeated, the negative pressure so induced may lead first to some degree of loosening of the attachments of the sacculus, and then to its complete eversion. There may be another factor. The need of occasionally "clearing the throat," whilst speaking, is probably due to the descent of mucus from the sacculus and its engagement in the glottis, which impairs the proper vibration of the cords; a slight respiratory effort dislodges the secretion and restores the voice. The act of forcible coughing might thus, should an unusual amount of stringy mucus project from the sacculus, be followed by a drag which would tend to empty the latter and loosen its connections.

The little model which I exhibit is constructed of a length of rubber tubing of the size of the trachea; near the top an oval slit has been cut horizontally into its side, and over this is fixed a short piece of the blind end of a thin rubber finger-cot. Each time the tube is blown through, the cot collapses, being drawn inwards by the *negative* pressure so produced. If the distal end of the tube is closed, so as to make the pressure *positive*, the cot is distended so as to rupture, or is blown away from the oval rim over which it is fixed.

The following note upon the closure of the glottis has been kindly furnished to me by my colleague, Mr W. G. Howarth:—"If the larynx is examined by the direct method, it will be seen that when coughing or any other spasm occurs, the ventricular bands close over the true cords so as to conceal the latter from view. If, however, the bands are pressed upon with a probe, they can be readily displaced; the vocal cords are then disclosed in firm apposition."

Dr JOBSON HORNE said when laryngologists referred to the ventricle they included the sacculi, "the greater includes the less," and by "prolapse of the ventricle" they obviously meant prolapse of the sacculus. It was common knowledge that the ventricle could not prolapse. A section through the larynx showed that the walls of the ventricle were so tightly attached that their prolapse or eversion was physically impossible. It was only the sacculi which prolapsed.

Sir JAMES DUNDAS-GRANT believed that the ventricular bands did come together, and he had observed this in an elderly woman told to "bear down" when the larynx was examined. Dr Smurthwaite also had observed this in "vicarious" action of the ventricular bands in soldiers who had nerve troubles, and apparent inaction of the adductors of the vocal cords. He suggested certain muscular fibres which came into action to bring this about, probably in the thyro-ary-epiglottic muscles.

PROFESSOR SHATTOCK (in reply) said the distinction between the ventricle and the sacculus was one recognised by anatomists. On the argument that the ventricle included the sacculus, as the greater included the less, the vermiform appendix might find itself without a name, since it could be viewed as part of the cæcum. To Sir James Dundas-Grant he replied that the approximation of the ventricular bands so hid the parts beneath that nothing could be inferred as to the rôle the cords played in the closure of the glottis.



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### **Accessory Thyroid growing in the Œsophageal Lumen—**

H. LAWSON WHALE, F.R.C.S.—Female, aged 58, seen September 1921, with history of an impacted fish-bone in the gullet. Examination with Brüning's tube revealed no bone, but a swelling on the dorsal aspect of the lumen, at the level of the second dorsal intervertebral disc. The excrescence was moriform, attached by a broad pedicle, roughly spherical, and the size of a small cherry. It was easily removed.

Dr Sanguinetti pronounced the tissue to be purely thyroid. Professor Shattock confirms this, and remarks that "although such aberrant formations have been encountered higher up in the pharynx, their occurrence in the œsophagus does not appear to have been as yet recorded."

### **Paralysis of the Left Recurrent Laryngeal Nerve due to Pressure of Mediastinal Glands—**

Sir JAMES DUNDAS-GRANT.—Female, aged 49, first seen 20th September, with hoarseness of two years' duration following influenza. The left vocal cord found fixed in the cadaveric position; no tracheal tugging. X-rays showed old fibrosis of both apices, many mediastinal glands, but no evidence of thoracic aneurysm.

The PRESIDENT showed an illustration of a similar condition, in which paralysis of the left recurrent nerve was due to the pressure of mediastinal glands.

### **Former Paralysis of Left Recurrent Nerve; Tracheal Tugging; Suspected Aneurysm—**

Sir JAMES DUNDAS-GRANT.—Male, aged 43; X-rays in October, 1919, showed "general enlargement of aortic shadow; some encroachment into the posterior mediastinum either from a general dilatation or aneurysm involving whole of thoracic arch." Wassermann positive.

On 11th January 1921 the left vocal cord was in the cadaveric position. On 1st October the vocal cords moved normally: some amount of tracheal tugging. Patient has been continuously taking iodide of potassium.

Dr W. HILL said there could be no doubt about the aneurysm, which was of considerable size.

Dr DAN M'KENZIE referred to a similar case in which the vocal cord paralysis cleared up and the shadow of the enlarged mediastinal glands disappeared after antisyphilitic treatment.

Dr P. WATSON-WILLIAMS pointed out the possibility of temporary paralysis in aneurysm. He referred to a patient who had sometimes complete paralysis when he took exercise, but when resting only abductor paralysis.

Sir JAMES DUNDAS-GRANT (in reply) remarked that the temporary paralysis might be due to a peri-neuritis, or to an inflammatory condition, not merely from pressure of the aneurysm. Discussions on paralysis of the vocal cord in mitral stenosis in a number of cases suggested a peri-neuritis of the nerve. He would report on the case later.

## ABSTRACTS

### EAR.

*Treatment in Deaf-mutism of the Congenital Syphilis Type.* G. DIDIER.  
(*Oto-Rhino-Laryngologie Internationale*, July 1921.)

Neuro-labyrinthitis in cases of congenital syphilis is usually thought to be incurable. The writer quotes a case where the usual treatment by arsenic and mercury gave a good result. His conclusions regarding the case were as follows:—

(1) The hearing in the right ear, which had been damaged for many years, was not benefited by the treatment.

(2) In the left ear, where the disease had been apparent for only a few months, hearing was much improved.

(3) The results of treatment in the left ear showed remissions on two different occasions, as shown by the hearing tests. The auditory apparatus became affected at different times. On the left side, when treatment was commenced, the disease was still active and was able to be held in check. On the right, the damage had been done and the ear was incapable of improvement. GAVIN YOUNG.

*Local Anæsthesia for Simple Mastoid Operations.* E. E. KOEBBE, B.S., M.D., Lieut.-Commander, Medical Corps, U.S.A. Navy. (*The Journ. Amer. Med. Assoc.*, vol. lxxvi., No. 29, 14th May 1921.)

The paper deals with seventy-two patients between 15 and 32 years of age, in whom the simple mastoid operation was performed under local anæsthesia. Prior to the operation the words "mastoid" and "operation" are avoided; other expressions are used such as "opening the bone" or "getting out the pus." Care is taken to have the patient resting comfortably on the table, and he is not brought to the table until all preparations have been completed. During the operation it is advantageous for the operator to carry on a conversation which has no bearing on the operation.

The technic is as follows: 1 per cent. procain with from 1 to 2 drams of 1-1000 epinephrin solution to the ounce is used. Each is boiled separately, and the total amount injected is from 6 to 8 c.c. An ordinary 2-c.c. Luer syringe with a No. 23 gauge 1-inch needle has been used. The subcutaneous tissues are first infiltrated, beginning at a point directly posterior to the external auditory meatus in the line of incision and following the line of incision to its most upper and anterior point, and then downward anterior to the pinna as far as the level of the tragus. The next infiltration begins at the same point as the first, and extends downward to about one inch below the mastoid tip. At this point a slightly deeper injection is made; this effectively blocks

## Ear

the great auricular nerve. Directly below the mastoid tip a deeper injection is now made; this blocks the posterior auricular nerve. The branches of the small occipital nerve are blocked about one and a half inches posterior to and on a level with the external auditory meatus. The needle is now inserted from behind the ear into the posterior wall of the external auditory canal, nearly to the attachment of the tympanic membrane. This step is very important, as the patient, if this injection is not made, will experience pain when the periosteum around the canal is elevated and the pinna is pushed forward. Finally, the needle is thrust under the periosteum in four or five places, so that the anæsthetic completely infiltrates all the periosteum that is to be elevated. All this is done before the skin incision is made, and it is not necessary to use any more anæsthetic after the operation has been begun.

The operation itself differs in no way from that ordinarily carried out. The author in his cases used an electrically driven burr to make the first opening in the bone, and he completed the operation with rongeur forceps and curettes in the usual manner.

As thirty-five of the cases were preceded by measles with its bronchial complications, the disadvantage of general anæsthesia was avoided. One patient was operated upon on the third day of his pneumonia and his mastoid wound was healed in twelve days.

The method is applicable to all patients except children too young to be reasoned with. The patients operated upon did not complain of any undue distress; some, the author says, fell asleep, and in those who had to have the other side operated upon there was no objection to local anæsthesia.

PERRY GOLDSMITH.

### *Operation under Local Anæsthesia in Cases of Fistula of the Labyrinth.*

R. BÁRÁNY. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 and 2.)

The use of local anæsthesia for the radical mastoid operation was introduced by Neumann fifteen years ago. It does not appear to have been widely adopted, but Bárány considers that it should be employed in cases of labyrinth fistula with functioning labyrinth. The operation is not pleasant for the patient, as he is apt to suffer from severe vertigo and vomiting, but local anæsthesia is nevertheless advisable, because only in this way can the fistula be completely protected from injury. Contact of instruments with the affected area becomes immediately obvious, although the fistula itself may not be visible. The object is the avoidance of post-operative labyrinthitis and of post-operative deterioration of the hearing, which otherwise is to be expected in a majority of these cases, even after the most careful manipulation. In six of the author's cases dealt with by this method the operation was followed by only slight symptoms of labyrinth disturbance, and the hearing was either improved or no worse than it was before. In a

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seventh case in which cholesteatomatous material had to be removed from the fistula, the operation was followed by nystagmus and increased loss of hearing.

THOMAS GUTHRIE.

*Vestibular Shock : A Contribution to our Knowledge of Sudden Attacks of Vertigo with Loss of Consciousness.* GOTTFRIED TRAUTMANN. (*Münch. Med. Wochenschrift*, Nr. 35, Jahr. 68.)

These cases may be differentiated from others which exhibit the Menière symptom complex in that the exciting lesion confines itself to the vestibular apparatus and is not accompanied or followed by disturbances of audition.

Two interesting examples occurring in patients of middle age and in good health are quoted in full. They were examined within two hours of the onset of the attack. In both cases unconsciousness succeeded the sudden onset of symptoms of violent vestibular irritation, which set in without apparent cause. Upon the return of consciousness, which was not long delayed, the vestibular and auditory apparatus were examined by modern methods. This showed that the labyrinth was in a state of abnormal excitability, whilst the hearing remained normal. Within a short time in both cases the vestibular apparatus again reacted in a normal manner, and complete recovery eventually ensued.

In these cases it is only permissible to speak of an injury to the vestibular apparatus, as there is no definite indication for attributing the attacks to hæmorrhage. In cases due to embolism, it is conceivable that the vestibule or cochlea will suffer alone or in unison, according as the obstruction takes place before or after the internal auditory artery divides into its vestibular or cochlear branches.

Though the increase of endolabyrinthine pressure as a result of venous congestion is a debatable point, it will be realised that should such occur the cochlea will most readily suffer when the inferior petrosal sinus is obstructed, and the vestibule when the transverse sinus is at fault. In any case an increase of the endolabyrinthine pressure, either localised or diffuse, must injure the sensory end-organs, even when, as in the cases cited, the increased pressure is not of auditory origin. The occurrence of an increased amount of fluid in these cases may in the etiological and pathological sense be likened to glaucoma, urticaria, or an acute circumscribed idiopathic œdema.

In considering the etiology of such cases it is necessary to exclude intoxications such as nicotine, and also reflexes from other organs.

The author suggests that the true cases of vestibular shock or apoplexy are of hæmorrhagic origin and of bad prognosis, whilst the other forms, similar to those described, are of an angioneurotic nature. If the affection is presumed to be of the latter type, other signs of angioneurosis should be sought for, especially on the skin.

JAMES B. HORGAN.

# Pharynx

*Drugs as a Causative Factor in Neuro-Labyrinthitis.* WILLIAM G. SHEMELEY, Jr., M.D., Philadelphia, Pa. (*Journal of Ophthalmol., Otol., and Laryngol.*, February 1921).

In susceptible persons, the administration of arsenic, mercury, quinine, aspirin, or salicylates is liable to cause neuro-labyrinthitis. Not only may this condition readily be mistaken for an aural manifestation of syphilis, malaria, or rheumatism, but the differential diagnosis may still further be obscured by concurrent suppurative otitis.

Dr SHEMELEY has noted the following distinctive features. The onset is usually acute with deafness, tinnitus, and vertigo. There is spontaneous nystagmus to the sound side and diminished caloric reaction on the affected side. Otoscopic appearances are unaltered, except in the presence of herpes zoster of the tympanic membrane.

It is possible to differentiate between neuro-labyrinthitis and otitis interna by means of the galvanic tests. During the irritative stage of the former, the normal catelectrotonus of the nerve is intensified, so that a cathodal stimulus of 1 ma. produces nystagmus; in the latter 7 ma. is the average minimal current. Should atrophy ensue, an 18-ma. current gives no reaction. Further refinements of the test are possible. Again, implication of other cranial nerves is common in toxic affections: pareses (Bell's palsy excepted) are rare in otitis.

Three detailed case-reports prove that the subject holds for the investigator a wealth of instructive data, particularly in its ophthalmic aspects.

Clearly, in the treatment of syphilis by neo-salvarsan, any disturbance of the auditory or static functions with altered labyrinthine reactions after each injection is a strong indication for resort to other remedies.

Cases of neuro-labyrinthitis due to tobacco, alcohol—especially wood alcohol—lead, and carbon-monoxide poisoning occur from time to time.

W. OLIVER LODGE.

## PHARYNX.

*Report on the Shick Test and Toxin-antitoxin Immunisation at the Children Home, Winnipeg.* Dr GORDON CHOWN. (*Canadian Medical Association Journal*, Vol. xi., No. 5, May 1921.)

This report is presented to stimulate a more general interest in the subject, with the hope that our children in the various public institutions may receive the benefit of the immunity against diphtheria afforded by antitoxin injections. The number tested was 156. Some slight difficulty may be experienced in the interpretation of the results owing to the occasional pseudo-reaction. This reaction is

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seen in relatively few of the older children, but in a much larger number in adults, in whom it is important to recognise and control both by the injection of heated toxin and by observing the clinical course of the reaction. It was noted that eleven of the cases with a previous history of diphtheria gave a negative Shick reaction while seven gave a positive reaction, indicating that an attack of diphtheria does not absolutely protect against another attack.

The positive cases number 92 (a trace of redness at the end of ninety-six hours was termed positive). One cubic centimetre of toxin-antitoxin was administered to all positive cases, and in no instance had the administration been followed by a severe reaction. The author thinks that steps should be taken to urge the more general adoption of the test, not only in institutions but in schools.

PERRY G. GOLDSMITH.

## PHARYNX AND NASO-PHARYNX.

*Some Remarks on Tonsillectomy and Adenoidectomy.* L. M. HUBBY.  
(*Medical Record*, 16th April 1921.)

The indications for tonsillectomy are :—

1. Hypertrophy sufficient to cause mechanical obstruction.
2. Manifest pathological conditions of tonsils, with crypts exuding infective material.
3. A history of repeated infections.
4. Cervical adenitis, especially if tuberculous.
5. General diseases such as acute articular rheumatism, arthritides, endocarditis, glomerular nephritis, appendicitis, but only during the quiescent stages.
6. Thyroid disease.

The indications for the removal of adenoids are :—

1. Obstruction in the naso-pharynx sufficient to cause mouth-breathing.
2. Any demonstrable growth of lymphoid tissue in the naso-pharynx.

Contra-indications are :—

Diabetes mellitus, acute rhinitis or tonsillitis, acute stages of rheumatism, endocarditis, etc., conditions of low nutrition, all diseases associated with fever, status lymphaticus, and hæmorrhagic diathesis.

In order to remove tonsils the writer prefers the Sluder method, modified in the case of adults by the use of a combined snare guillotine, of which the Braun is possibly the best type. He usually employs an electric suction-tube throughout for keeping the field clear of blood and saliva. For the hæmorrhage which occasionally occurs, the application of adrenalin solution followed by 12 per cent. argent. nitrat. solution to the tonsillar bed is recommended. Contrary to the usual English custom he employs a mild antiseptic saline spray to the nose and throat every three hours for a few days following the removal of tonsils and adenoids.

LINDLEY SEWELL.

# Nose and Accessory Sinuses

*The Essential Causes of Adenoids and their Association with Rickets.*

H. MERRALL. (*Lancet*, Vol. ii., 1921, p. 994.)

H. Merrall's paper with this title is a valuable one. His summary is as follows:—A naso-pharyngeal catarrh extending into the alimentary canal and affecting both digestion and assimilation; exaggerated lymphocytosis and swollen lymph glands rapidly losing their protective influence owing to fibroid changes: the swallowing of large quantities of infected mucus, a drain on the system from the over-production of lymphocytes causing anæmia—to say nothing of the abnormal secretion of the connective-tissue element containing mucin and of the lessened alkalinity of the blood. The chief cause, excluding the exanthemata, is the mainly disregarded frequently recurring colds.

MACLEOD YEARSLEY.

## NOSE AND ACCESSORY SINUSES.

*Sinus Surgery as applied to the Eyes and General Health.* J. IVIMY

DOWLING, M.D., F.A.C.S. (*Journal of Oph., Otol., and Laryngol.*, April 1921.)

Ónodi and others have shown that the nasal accessory sinuses are rarely sufficiently developed to require operative treatment before the fifth year of life. Nevertheless, catarrhal conditions sometimes persist after removal of adenoids in children, and remain a menace to health. When this state of affairs is due to sinus infection it may generally be overcome by daily irrigation of the nose.

In adolescents and adults, nasal sinus disease—which is so liable to give rise to neuralgia, lachrymal infection, mastoid infection, etc., etc.—is best treated by operative methods directed to the establishment of proper ventilation and the promotion of natural drainage.

An important link between intra-nasal disease on the one hand, and headache, neuralgia, and ocular diseases on the other, is the sphenopalatine ganglion, located posterior to the middle turbinate, at which point, according to Sluder, it may be injected.

Disease of the nasal accessory sinuses may (Dr Dowling believes) be an important factor in the etiology of glaucoma. To Knies' "specific glaucoma toxin" theory the following original corollary is added: "The infected sinuses act as natural laboratories in which the germs multiply and develop toxins which may be conveyed by way of vascular or lymphatic channels to the uveal tract, and so occasion the change from crystalloid to the colloidal state, *this change being the sine qua non of glaucoma.*"

The typical neuralgic condition of tic douloureux should suggest the maxillary sinuses primarily, because the dental nerves are superficially located within the maxillary sinuses, and these cavities when diseased will cause very definite symptoms of neuralgic type.

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Another important consideration is the location of the pituitary gland. After operations upon the posterior ethmoid and sphenoid cavities, in one case, a gain in weight of from 20 to 40 lb. occurred. In another case, in addition to an increase in weight, the phalangeal joints became enlarged and the patient acquired some of the characteristics of acromegaly.

Cushing suggests that infection of the pars nervosa sometimes gives rise to polyuria. Dr Dowling has twice observed, after extensive intranasal operations, a greatly increased excretion of urine, in one instance as much as 90 oz. having been passed per diem.

Finally, some relation would appear to exist between empyemata of the nasal sinuses and epilepsy.

In the discussion of the above paper at a meeting of the O. O. and L. Society, Dr Rumsey, of Baltimore, described a case of epilepsy relieved by operation on diseased frontal and ethmoidal sinuses. He also added acidosis in the young to the group of obscure maladies which apparently are influenced by infection of the nasal accessory sinuses.

WM. OLIVER LODGE.

*Report of Four Cases of Radical Frontal Sinus Operation with Unusual Pathological Findings.* Dr F. O. LEWIS. (*Laryngoscope*, Vol. xxxi., p. 179.)

Dr Lewis publishes the result of four frontal sinus cases, all of which had had from two to five previous operations. He found intra-tracheal anæsthesia very useful. Intra-nasal operations had been unsuccessful in these cases, and Dr Lewis shows how necessary it is in chronic infections of long duration to remove every vestige of disease. He proposes to do plastic operations later to get rid of the deformity.

ANDREW CAMPBELL.

*Congenital Occlusions of the Choanæ.* Prof. J. MOURET and D. P. CAZEJUST. (*Revue de Laryngologie*, March 1921.)

This article is interesting chiefly on account of a well-illustrated description of the development of the nasal fossæ for which the writers acknowledge themselves to be largely indebted to Professor Vialleton. They reject the view that congenital atresia of the choanæ is due to persistence of the upper part of the bucco-pharyngeal membrane for two reasons—(1) An occlusion so caused would be situated posterior to the level of the choanal openings; (2) If the occlusion were imperfect, one would expect to find the gap at the lower part of the partition, whereas it is the upper part which is deficient in cases of partial atresia. The explanation put forward by them is that the nasal fossæ are the result of the enlargement of the primitive nasal cleft by the growth of the epithelium lining them. This forms certain folds



## Nose and Accessory Sinuses

which constitute the turbinals, and inferior and middle meatuses. Occlusion of the choanæ takes place owing to interruption in the backward extension of the grooves forming the two meatuses.

Dealing with the operative treatment of the obstruction, the writers insist on the great importance of a free removal of the posterior part of the vomer and septal mucous membrane covering it, as first carried out by Dan M'Kenzie in 1910.

G. WILKINSON.

### *Perforations of the Nasal Septum due to Inhalation of Arsenious Oxide.*

LAWRENCE G. DUNLOP, S.B., M.D., Anaconda, Montana. (*The Journ. of Amer. Med. Assoc.*, Vol. lxxvi., No. 9, 26th February 1921.)

This paper deals with septal perforations due to the inhalation of arsenious oxide dust among the workers in the arsenic department of the largest copper mine in the world—Anaconda, Montana. The septal mucosa at Kiesselbach's area is the point where perforation takes place. The impinging of the air currents at this point tends to keep it irritated, while the presence of deflections or spurs adds to the ease with which irritating dust may collect. When the dust consisting largely of arsenious oxide enters the nose and comes in contact with moisture, arsenious acid is formed which causes the necrosis. At first a white slightly elevated area about 5 mm. in diameter develops. If this area is then protected by an oily mixture containing camphor and menthol, the elevated area will return to normal and will even do so if the mucosa is ulcerated sufficiently to expose the cartilage. Workmen are, however, careless, with the result that a similar process takes place on the other side of the septum and the cartilage disappears by dystrophy. Extensive destruction is not infrequent, but a saddle-back nose is rarely seen. The perforation when complete has the appearance of a squarely amputated finger, the cartilage being flush with the mucosa. The cartilage is often very greatly thickened causing nasal obstruction, while the mucosa in the acute stage is enormously thickened, and tends to retract from the septum as in a submucous resection. The formation of crusts adds to the discomfort. Slight epistaxis is frequent during the first few weeks of the ulcerative stage. In ten consecutive cases the Wassermann test was negative.

Prophylaxis is best carried out by the use of the camphor and menthol mixture in oil. Masks and nasal plugging lead to other disagreeable conditions, and are not advised. The nasal obstruction may be relieved in some cases by removing the thickened cartilage and producing a condition as in a submucous resection. The perforation if small may be closed over by a plastic operation, but if large, a mechanical obturator may be advised to relieve the objectionable crusting.

PERRY GOLDSMITH.

## LETTER TO THE EDITORS

TO THE EDITORS,

*Journal of Laryngology and Otology.*

DEAR SIRS,—In your issue for December, Mr Harold Barwell writes that he does not approve of partial removal of the tonsils, and he states that I base my argument against enucleation of the tonsils as a routine method, “largely on the cases in which enlarged but healthy tonsils are present in children suffering from nasal obstruction due to adenoids.” If he refers to my paper, he will see that I do not speak of “healthy” tonsils, but merely enlarged tonsils, for it may be contended that a tonsil that exceeds its normal dimensions is in an unhealthy condition.

It is true that the tonsillar tissue contracts when free nasal respiration has been established, but I do not agree with Mr Barwell that “the logical treatment would be to remove the adenoids and to leave the tonsils to shrink untouched,” because the enlargement is frequently considerable and diminishes the oral passage-way. In my opinion, therefore, the logical treatment is to remove the projecting portion and restore the normal space.

I agree with Mr Barwell that in many cases the glands below the angle of the jaw can be felt to be slightly enlarged, but I consider that this condition is secondary to an unhealthy state of the tonsil, which may be produced by nasal obstruction. That this is the case, is shown by the glandular enlargement subsiding after nasal respiration has been restored to a normal condition. Therefore I contend that the submaxillary enlargement is not sufficient reason for the tonsil to be enucleated.

Mr Barwell states that he is not clear whether by the term “enucleation” I refer “only to the operation of dissection,” or whether I include “complete removal with the guillotine.” To this I reply that I include both these operations. Mr Barwell states that “complete removal with the guillotine does not produce any disabling cicatrisation,” but he agrees with me that the cicatrisation following the dissection operation may be a cause of disability. I cannot endorse Mr Barwell’s statement that complete removal with the guillotine does not produce any disabling cicatrisation, for I have seen many patients with a considerable amount after this operation, and one of the ladies referred to in my paper, whose singing voice had been ruined by the scarring, had been operated on with a guillotine. I am unable also to agree with him that enucleation is justifiable merely because the tonsil is fixed by adhesions to the pillars. I have found the result satisfactory

## Letter to the Editors

when the edges were separated so as to allow the projecting portion of the tonsil to be sliced off.

Mr Barwell writes that, after nearly eighteen years of operating on tonsils and adenoids, his experience is that there is more bleeding after partial removal of a tonsil than after its enucleation. This statement very greatly surprises me. In the private practice of one surgeon only within about the last eighteen months I have happened to hear of more than one case in which the hæmorrhage after enucleation was sufficiently severe to cause grave anxiety, but I do not know the precise number of such cases which he had during this period. During my experience of forty years in practice and three years previously as Resident Medical Officer to the Throat Hospital, Golden Square, I can recollect admitting only one patient to a hospital for hæmorrhage following partial removal of a tonsil, and that was the first case of severe hæmorrhage which occurred to me. I may add that I have never had to remain with a patient on account of hæmorrhage following partial removal, or been called back to the patient on this account. This cannot be said by those who practise enucleation.

Mr Barwell states that he thinks that recurrent tonsillar enlargement is not due to neglect to remove the posterior ends of the inferior turbinals, for he is "prepared to remove the ends when they are enlarged." From this I gather that Mr Barwell does not frequently discover them to be enlarged. If this be so, his statement endorses my view as to the cause of the recurrence of enlargement of the tonsils, for in my experience it is but seldom that one or both ends are of normal size and do not require removal when adenoids exist. Not passing a snare as a matter of routine, and thus ensuring subsequently a full nasal airway, may account for the cases to which Mr Barwell refers, in which children are brought to him two or three years after he has removed the adenoids only, with symptoms of tonsillar inflammation and with enlarged tonsils. It is only by passing a snare that enlargement of the posterior extremity can be ascertained with certainty.

Mr Barwell states that he finds less liability to aural and other complications after enucleation than after partial removal of the tonsils. I can remember only one case of aural complication following partial removal.

Considering the amount of cicatrisation which frequently follows enucleation, to say nothing of the risk of hæmorrhage, which no one can deny is at times very severe, I cannot but condemn Mr Barwell's practice of enucleating tonsils which are not enlarged and which do not present signs of disease. If healthy organs are to be removed merely on the plea that some day they may become unhealthy, where is the line to be drawn?

T. MARK HOVELL.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W. 1.

*Section of Laryngology*—*President*, Sir William Milligan, M.D. *Hon. Secretaries*, Walter G. Howarth, F.R.C.S., and T. B. Layton, D.S.O., M.S. The next Meeting of the Section will be held on Friday, 3rd February, at 4.45 o'clock.

The Council has decided to devote the Meeting to a formal discussion upon "The Treatment of Malignant Disease of the Accessory Nasal Sinuses."

Mr Musgrave Woodman will open the discussion on its surgical aspect and Dr Reginald Morton will deal with the radiological side of the question.

*Section of Otology*—*President*, A. Logan Turner, M.D. *Hon. Secretaries*, Norman Patterson, F.R.C.S., and F. J. Cleminson, M.Ch. The next Meeting of the Section will be held on Friday, 17th February, at 5 o'clock. Members proposing to show patients or specimens, etc., should send notice along with a short written description to the Senior Hon. Secretary, Norman Patterson, F.R.C.S., 16 Devonshire Place, London, W. 1, at least twelve days before the Meeting.

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BRITISH MEDICAL ASSOCIATION, GLASGOW.

The Ninetieth Annual Meeting of the British Medical Association will be held under the Presidency of Sir William Macewen, F.R.S., from the 25th to the 29th July inclusive. The Sectional Meetings are arranged for the 26th, 27th, and 28th. Laryngology and Otology have been placed amongst the Single Day Sections.

Dr John McIntyre (Glasgow) is President of the Section of Laryngology, and Dr A. A. Gray (Glasgow) is President of the Section of Otology.

\* \* \*

TENTH INTERNATIONAL CONGRESS OF OTOTOLOGY, PARIS.

The Congress will be held at the Faculté de Médecine de Paris from the 19th to the 22nd July under the patronage of M. Bérard, Minister of Public Instruction, and under the Presidency of Professor Pierre Sebileau of Paris. The subscription to the Congress has been fixed at 100 francs (£2). *Secretary-General*, Dr A. Hautant, 28 rue Marbeuf, Paris (VIII). *Treasurer*, Dr G. Laurens, 4 Avenue Hoche, Paris (VIII).

## General Notes

Those who are desirous of reading papers are requested to send the title of their communications as soon as possible after inscribing their names as members of Congress. This along with a short synopsis should be in the hands of the Secretary not later than 1st April.

\* \* \*

The American Laryngological Association will meet, under the Presidency of Dr Harmon Smith, in Washington, D.C., on 1st, 2nd, and 3rd May.

The American Otological Society, under the Presidency of Dr H. S. Birkett of Montreal, will meet in Washington, D.C., on 2nd and 3rd May. *Secretary*, Dr Thomas J. Harris, 104 East 40th Street, New York.

A cordial invitation has been extended by the American Otological Society to the Section of Otology of the Royal Society of Medicine.

\* \* \*

The Section of Laryngology and Otology of the American Medical Association, under the Presidency of Dr Joseph A. Stucky, will meet at St Louis from 22nd to 26th May.

\* \* \*

### TUBERCULOSIS SOCIETY OF SCOTLAND.

This recently formed Society held its first Ordinary Meeting in Edinburgh, on 11th November 1921, under the Presidency of Sir Robert Philip. The subject selected for discussion was, *Tuberculosis of the Lymphatic System*.

The Society has been founded with the object of bringing together for purposes of co-operation and discussion members of the Profession resident in Scotland who are interested in Tuberculosis from the medical, surgical, pathological, statistical, or administrative point of view, and in order to stimulate observation and research along the numerous lines which have their common centre in Tuberculosis. The Senior Secretary of the Society is Dr W. Leslie Lyall, 8 Murrayfield Gardens, Edinburgh.

\* \* \*

Dr James Galbraith Connal (Glasgow) has been elected President of the Scottish Otological and Laryngological Society for the ensuing year.

\* \* \*

Through the courtesy of Dr Bryson Delavan of New York, we are able to bring to the notice of our readers the regulations for the de Roalde's Prize of the American Laryngological Association. A gold medal, of the value of 150 dollars, is offered for the best original thesis upon a subject pertaining to Laryngology or Rhinology. It is now open

## General Notes

for competition to non-members of the Association. Theses must be in the hands of the Chairman of the Prize Committee prior to 1st April 1922. Chairman, Dr D. Bryson Delavan, 40 East 41st Street, New York, U.S.A.

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### THE QUEEN'S HOSPITAL, SIDCUP.

The following is an extract from *The Times* of 5th November 1921:—

“A report on the four years' work of the Queen's Hospital, Sidcup, on the treatment of sailors and soldiers suffering from facial and jaw injuries, just issued by the committee, states that the total amount expended on the building and equipment of the Hospital has been approximately £149,000, and the total amount of contributions, including generous donations from the Queen (from a fund placed at Her Majesty's disposal), approximately £213,000. Up to 30th June last 11,752 major operations had been carried out.

Separate Canadian, Australian, and New Zealand units, with their own medical officers and staffs, were accommodated, and many American surgeons and dentists were from time to time attached for training. The work has involved the supplying of badly disfigured men with one or more new facial features, or even, in some cases, the half of a face, chiefly by the scientific grafting of bone and skin from other parts of their bodies. Almost incredible results have been achieved in a great number of cases, and it is claimed that of all the men treated there are now not more than fifteen or sixteen whose disfigurement is likely to be permanently of a distressing character. To Major H. D. Gillies, the principal surgeon, chiefly belongs the credit for these achievements.”

\* \* \*

### WHAT THE MOTHER OF A YOUNG DEAF CHILD CAN DO.

The attention of every medical man engaged in practice should be directed to the small pamphlet which has recently appeared under the above title. It is from the pen of Miss Martin, one of the teachers of the deaf under the Glasgow Education Authority, and the value of what she has written therein is attested to by no less an authority than Dr J. Kerr Love.

Nursery Schools have been established in Glasgow for the training of deaf children between the ages of 2½ and 5 years, and visiting teachers have been appointed to assist mothers in instructing the young deaf children at home, so that the valuable years prior to school age may not be lost. How mothers may help is clearly and intelligently explained in the pamphlet before us.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## SOME PROBLEMS WHICH MAY PRESENT THEMSELVES TO THE OCCASIONAL BRONCHO-ÆSOPHAGOSCOPIST.\*

By RICHMOND M'KINNEY, A.M., M.D., F.A.C.S., Memphis, Tenn.,  
Professor of Oto-Laryngology in the College of Medicine, University  
of Tennessee.

THE term "occasional" is used advisedly as applying to the majority of those who undertake to do broncho-æso-phag-scope-y, for there are very few to whom cases of the character demanding this kind of instrumentation come with sufficient frequency and regularity to exempt them from this classification. To these, therefore, the problems are more real, although I think I am justified in saying that broncho-æso-phag-scope-y is nearly always more or less a problem to anyone.

Early in my career as a dilettante broncho-æso-phag-scope-y, before the chastening hand of experience had been laid upon me, with that temerity which so often is found in the beginner I sought to explain the relative advantages and disadvantages of the proximally lighted tubes as exemplified by the instruments of Bruenings, and those with distal illumination so cleverly devised by Jackson, concluding that at my hands the proximally lighted instruments were superior.†

Several years of practical application have intervened since this illuminating essay of mine was read before an unsuspecting

\* Read before the American Academy of Ophthalmology and Oto-Laryngology, Philadelphia, 17th to 19th October 1921.

† R. M'Kinney, "Brief Comparison of Technic of Broncho-Æso-phag-scope-y with Jackson's and Bruenings' Methods," *Southern Medical Journal*, September 1913.

## Richmond M'Kinney

scientific body, and I find that I am now using the Jackson instruments in three-fourths of my cases, resorting to those of Bruenings only in œsophageal cases in the adult. With cocaine anæsthesia, the proximally illuminated Bruenings' tubes, with their comparatively larger lumen, can be used more advantageously by me than the Jackson tubes; but for bronchial work, and œsophagoscopy in the child, my experience has led me to use almost exclusively the Jackson type of instruments, the special advantage that I have found in the distally illuminated instruments being, the absence of unwieldy top-hamper, so to speak, giving greater freedom of movement, and the otherwise less cumbersome character of the tubes; the greatest disadvantage that I have found is in the obscuring of the small lamp in the end of the tube by secretions or blood, which of course can be removed by sponging or suction. On one occasion I lost a lamp from a bronchoscope, deep in a main stem bronchus, through its breaking from its base, but as the case was already *in extremis*, this accident did not add to the gravity of the condition.

Some years ago the *doyen* of American peroral endoscopists raised his voice against too protracted endeavour in removing bronchial foreign bodies, and I believe, as a general rule, he established a time limit of twenty minutes for a séance, especially in young children, and it is almost axiomatic that a bronchoscopy continued longer than thirty minutes is dangerous. I am sorry that this dictum has not, as evidenced in practice, been adopted as a cardinal principle by all broncho-œsophagoscopists. My own experience has been that, if I do not secure a foreign body in that limit, the exacting nature of the work has made me nervous, perhaps exhausted the patient, and further attempts at this time are quite likely to prove futile and may result disastrously to the patient. Sometimes a fatality follows such prolonged efforts, whereas postponement of further search until a future time—perhaps the next day—probably would have been attended by success. I realise that this is a trite proposition, but that I am justified in bringing it forward is exemplified in the fact that only last year I saw a child with a needle in the lung, who a few days previously had been bronchoscoped under ether by a very skilful colleague of mine, who, I was informed, had worked two or more hours continuously endeavouring to remove the needle. When I saw the little girl several days later she was profoundly septic,



# Problems for the Broncho-Cesophagoscopist

with pneumonia and a lung abscess, dying shortly afterwards. The child would, of course, have died in any case without removal of the needle, but I am citing the case as one where perhaps two or three short séances might have ended in success. I am convinced that after a few minutes' work with a tube in the lung the condition of the tissues must have been so congested, and the operator so disturbed and nervous over his lack of success, that further attempts necessarily would have failed. Yet we all hate to give up at the first attempt.

Reference to general anæsthesia in the case just mentioned brings up this all-important question of whether a general anæsthetic should be used in our bronchoscopic cases. This question is of more importance to the occasional operator than it is to one of Jackson's great skill, for we have all, I hope, witnessed the dexterity with which he works without a general anæsthetic in these cases. However, everyone cannot be a master technician, so this question comes keenly home to those of us who are not in constant practice in this work.

In discussing a paper before the Oto-Laryngological Section of the American Medical Association at Boston last June, I related my experience in removing cockle-burs from the larynx, and stated that where I had to deal with such foreign bodies in young children I put them under ether. Someone who joined in the discussion said that he disagreed with me as to the use of general anæsthesia, as he thought this should never be used in bronchoscopy. Now if this commentator had ever had occasion to remove a cockle-bur from the larynx of a struggling child, in great pain from the spines of the bur, which were buried in the vocal cords and spasmodically held there, I am sure he would not discourage the use of ether to render the process of removal painless, and to relax the convulsive cords. But when we consider purely bronchoscopic cases, I may say that in later years, as I grow more experienced, if not more skilful, I have been using general anæsthesia less and less; yet I would not say that I never use it, for I have cases occasionally where I am glad to have its aid.

It is pertinent to mention two cases from my own experience, which illustrate the disadvantages of general anæsthesia, and as one of the problems of the occasional broncho-cesophagoscopist, may serve as a warning in technic.

A child, two years of age, had a large lima bean in its trachea. The bean could be heard moving up and down in the trachea with respira-

## Richmond M'Kinney

tion. Ether was administered, and a Jackson speculum passed to the larynx. Just as this was done the bean jumped up between the vocal cords, spasmodically was held there, and the child turned blue. Death from asphyxiation was imminent. Quickly removing the speculum, I put my mouth over that of the child, blew with force, the bean slipped back into the trachea, and the child promptly rallied. The next day, without anæsthesia, the bean was removed without difficulty.

Another case was a tragedy.

A child of the same age—two years—had a lima bean in the trachea. That the bean had swollen was apparent from the laboured respiration, and this should have been my warning. Ether was given, but just as I began introducing the Jackson speculum, a deep inspiration sucked the greatly swollen bean down to and across the bifurcation, and the little patient immediately was asphyxiated. Tracheotomy was done at once, and a hurried attempt made to remove the swollen and softened bean, but the child was past our efforts at resuscitation before this was accomplished.

Had I avoided in this case the use of a general anæsthetic, the expulsive efforts of coughing probably would have prevented this unfortunate accident.

The chief disadvantages in the use of general anæsthesia, especially ether, are the loss of the involuntary reflexes, which aid in expulsion, and the increased congestion and flow of mucus with such an anæsthetic. The advantages are the control of older children, and a relaxation which sometimes facilitates the removal of sharp and pointed foreign bodies. Lye strictures of the œsophagus in young children, which are rather common, are in my experience handled much more satisfactorily without general anæsthesia, although, as a rule, these are dilated under a general anæsthetic. An œsophageal foreign body, such as an open safety-pin, for instance, doubtless could be handled by the occasional operator with greater facility under a general anæsthetic, but on the whole, as one becomes accustomed to working without general anæsthesia, one grows to prefer this method. After one has learned the art of working in bronchoscopy without general anæsthesia, there is infinite satisfaction, and a sense of freedom from worry about the anæsthetic, which one can never have if one is mindful of its dangers in this kind of work.

Does it seem possible that an expert radiographer, from a fluoroscopic examination, could mistake the location of an

## Problems for the Broncho-Œsophagoscopist

eightpenny nail in the trachea of a two-year-old child, and insist that it was in the œsophagus? This is a problem that came before me several years ago, and caused me to bewail my lack of self-assertion, for my opinion, as then expressed, was that the nail was in the trachea. There were almost no symptoms of obstruction, but the child died on the table while I was searching with an œsophagoscope for the nail in the œsophagus, and an immediate tracheotomy, with removal of the nail from the trachea, failed to save a life where the following of my first impulse, to bronchoscope the patient, might have done this.

Mention of the use of the fluoroscope gives me an opportunity to emphasise the value of this adjuvant in locating bronchial foreign bodies and in passing the bronchoscope down to these. Sometimes we encounter cases where the amount of secretion is so great that we have considerable difficulty in seeing the foreign body as the tube approaches it. In such cases the tube can be gently passed down to the object, while its progress is watched under the fluoroscope. This procedure doubtless will appeal more to the occasional bronchoscopist, but its value is not negligible, and its employment is not necessarily a confession of lack of skill in bronchoscopy.

Gentleness in manipulation is so essential in this kind of work that it would seem almost unnecessary to call attention to its importance, but it is the occasional broncho-œsophagoscopist who is most likely to violate this rule, so I am adding my plea to that of other more experienced workers, when care and a light touch are urged. I almost shiver as I read this when I recall some of the shoving and tugging of tubes and forceps that I have witnessed in some instances where the operator lacked in skill and patience. I have never seen a time where it was necessary to use force in passing either a bronchoscope or an œsophagoscope, and a forceps should never be closed and traction made except under the guidance of direct ocular observation, or sometimes with the aid of the fluoroscope.

Even with the utmost care tissues at times are bruised or lacerated, and where this has been done, post-operative care and watching must be constant until all danger is past. Sub-glottic œdema from traumatism of the tissues has carried off a number of patients through asphyxiation, and to my chapter of calamities I can add one of these.

Late one afternoon, from the œsophagus of a two-year-old

## Richmond M'Kinney

child I removed a large overall button. In extracting this, the tissues just behind the larynx were bruised, so, realising the possibility of œdema, I had a cold pack applied, and instructed the nurse in charge of the ward to call me if breathing became difficult. This was not done, and the child towards morning slowly became asphyxiated, dying, where an immediate tracheotomy would have saved it.

When breathing is bad in any of these cases—pre- or post-operative—a tracheotomy should be done. An early tracheotomy will save the life of many a child. It is not always easy to determine the cause and location of obstruction to breathing, so if the condition is bad it is better to do a tracheotomy, and then afterward seek to remove the cause. This has come home to me in a number of instances. I recall a case, in an infant one year of age, where I had done a hurried bronchoscopy looking for a chicken-bone, which I did not find, and was sitting that evening very serenely enjoying a “movie” when, to my astonishment, I saw flashed on the screen the undesired advertisement that I was wanted, and found the hospital calling me with the information that the child was choking to death. Arriving there, I saw that this was not exaggerated, so I performed tracheotomy, the chicken-bone popped out, and the child was saved.

The moral of this is: don't delay doing a tracheotomy where breathing is bad.

A certain well-known text-book, with the contents of which some of us doubtless are not any too well acquainted, says, “By their fruits shall ye know them,” and I trust that as I have gone along recounting my own mistakes in the technic of broncho-œsophagoscopy you will not conclude that my percentage of failures over-balances that of my successes, for I am merely holding up the other side of the shield, to present some of the problems which have come to me, notably several years back. I am frank in admitting the loss of patients which a richer experience might have saved, but I am also not unmindful of the fact that a very large percentage of my cases has been successful.

In my preamble I stated that practically any case of broncho-œsophagoscopy is a problem, and we have the oft-repeated confession of our foremost American clinician in this work to the effect, that his large degree of success has been due to the study he has given his individual cases.

# THE STRUCTURAL TYPE OF THE MASTOID PROCESS, BASED UPON THE SKIAGRAPHIC EXAMINATION OF ONE THOUSAND CRANIA OF VARIOUS RACES OF MANKIND.\*

By A. LOGAN TURNER, M.D., F.R.C.S.E., and the late  
Major W. G. PORTER, D.S.O., F.R.C.S.E.

## INTRODUCTION.

AT the Meeting of the Congress of American Surgeons held in London during the last week of July 1914, we gave the results of our clinical observations upon mastoid skiagraphy, but the outbreak of war interfered with the further progress of the anatomical investigation, the completion of which, for various reasons, was not possible until the spring of 1920.

After the publication, in 1906, of Arthur Cheate's valuable anatomical work upon the pneumatic and infantile or acellular types of mastoid process, and the presentation to the Museum of the Royal College of Surgeons of England of his unique collection of dissected temporal bones, there seemed little more to be said upon a subject which he had so thoroughly dealt with. But the application of radiology to the mastoid process as a method of research had not received hitherto the attention of anatomists, though, amongst otologists, Beck of Chicago had examined a very large number of temporal bones in this way. The value of the method as a means of conducting craniological research is obvious, when the only alternative is dissection, with its consequent partial mutilation of a number of valuable crania.

In utilising this modern method of investigation our primary object was to ascertain, from a large series of examinations, (*a*) to what extent the skiagram could be relied upon to determine the structural type of the mastoid process; (*b*) the frequency of the occurrence of the two types, the cellular and acellular; (*c*) the number of individual skulls in which asymmetry of mastoid types occurred; and (*d*) the types of process and the occurrence of asymmetry in the two sexes. With a knowledge of these fundamental points, the clinical

\* Presidential Address delivered by Dr A. Logan Turner at the Opening Meeting of the Section of Otology of the Royal Society of Medicine 21st October 1921.

## A. Logan Turner and W. G. Porter

application of the X-rays would be placed upon a more secure basis, and its more general employment in the study of acute ear disease might, in the future, be recommended with greater confidence. For our purpose, 1000 crania were placed at our disposal by the courtesy of Professor Arthur Robinson, to whom we are greatly indebted for advice and for the many facilities granted to us while carrying on our work in the Anatomical Department of the University of Edinburgh.

As the skulls examined formed part of the valuable craniological collection accumulated in the Anatomical Museum by the Monros, Goodsir, Turner and Cunningham, and catalogued and described by Sir William Turner, it became possible for us to enlarge the scope of our inquiry beyond the limits above outlined. The research, therefore, was developed along anthropological lines with the object of investigating the following points:—(a) The relative frequency of the occurrence of the cellular and acellular types of mastoid process in Dolichocephalic, Mesaticephalic, and Brachycephalic crania; (b) The possibility of the occurrence of one or other type of process in a race or races in such a proportion as to constitute a racial characteristic; (c) The question whether a relationship existed between the development of the air sinuses in the frontal bone and the pneumatic spaces in the temporal bones in similar types of skull and in various races of mankind.

The method employed in radiographing the skulls may be very briefly described. Each skull was placed laterally upon a board which was fixed at an angle of  $25^{\circ}$  with the horizontal plane, the negative being inserted between the temporal bone and the wooden support. The X-ray tube was then approximated close to the upper side of the skull opposite the parietal eminence. The duration of the exposure was from ten to fifteen seconds. The skull was then lifted and replaced upon the other side, a fresh negative was introduced and a second exposure was made. In this way only one mastoid region was thrown upon each plate. The negatives were developed and the two mastoid regions compared. Two thousand skiagrams were made in this way.\*

The results of the investigation will be detailed under two heads:—(I.) Anatomical; (II.) Anthropological.

\* All the photographs were made by Dr W. G. Porter prior to the outbreak of war.

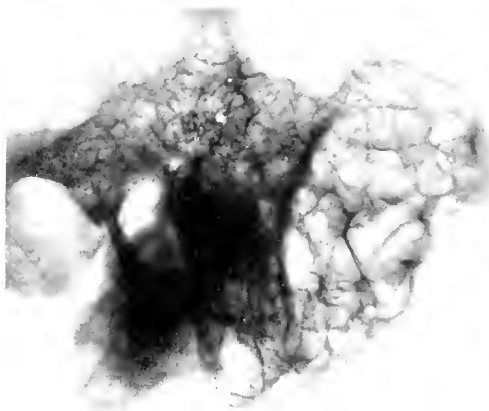




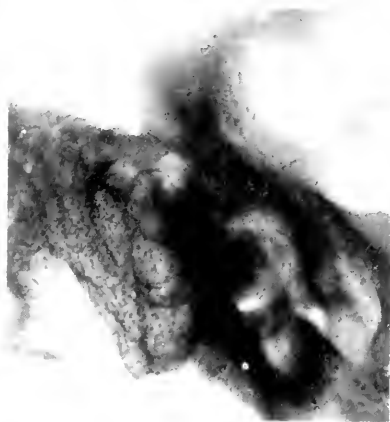
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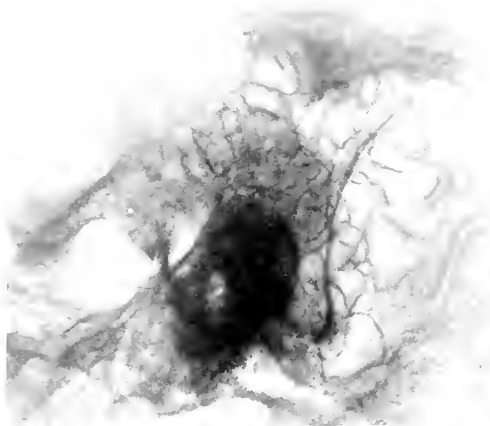
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# Structural Type of the Mastoid Process

## I. ANATOMICAL INVESTIGATION.

### (a) **The Skiagram and the Two Types of Mastoid Process.**—

Cheatle, in his description of the antrum and mastoid mass in infancy, points out that the latter is, as a rule, diploëtic or cancellous in structure, with a thin layer of compact bone separating the diploëtic tissue from the antrum. Occasionally the mastoid mass is of sclerotic or dense ivory consistence.

In the majority of individuals, cellular development takes place in the mastoid mass; this occurs very early in life, as a rule within the first five years after birth. In Cheatle's dissections the earliest evidence of pneumatic development was observed at one year and seven months. The cells may remain limited to the upper part of the mastoid, they may invade the dense outer antral wall, they may extend downwards occupying a part or the whole of the lower mastoid, or they may be developed in various directions beyond the limits of the mastoid mass itself. Whatever may be the limitation or the extension of the cells, the pneumatic spaces in every case are connected with each other, and directly or indirectly with the cavity of the antrum.

In studying the skiagram of the mastoid in the adult, therefore, it is necessary to recognise the appearance presented by the shadow of the two types of process, the cellular and the acellular; and, further, we must determine whether a correct interpretation of the two types is possible in every case. The accuracy, or otherwise, of the results which we have obtained in this investigation hinges upon the latter point, and the value of skiagraphy as a method of craniological research is based upon it.

Fig. 1 represents a coronal section through the left temporal bone and illustrates a well-developed cellular mastoid process. Fig. 2 is the skiagraphic representation of the same bone viewed from the surface before the section was made. The distinctive features denoting the cellular type of process are well seen in the skiagram. The outlines of the cells give the appearance of a network, the meshes of which vary in size. Figs. 3 and 4 show a right temporal bone and skiagram with a mastoid process of the diploëtic or acellular type. In the skiagram the diploëtic type is represented by a closer, stippled appearance of the shadow. Figs. 5 and 6 are additional illustrations of the cellular and acellular

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mastoid types in left temporal bones, as they are seen in two of the series of skiagrams examined.

A correct interpretation of the mastoid skiagram in the skull is not, as a rule, a matter of difficulty. In some instances, however, it is not easy to arrive at a definite conclusion as to the complete absence of a cellular element. In the head of the living person, the interpretation may be even more difficult. Table I. shows the percentage of cellular and acellular mastoid types in a number of European crania as ascertained, on the one hand by dissection, and on the other by skiagraphic examination, and it demonstrates the similarity in the results obtained by the two methods.

TABLE I.

*Cellular and Acellular Mastoid Types in European Crania.*

Author.	Temporal Bones.	Cellular.	Acellular.
Zuckerkandl (Dissection) . . .	250	79 per cent.	20 per cent.
Cheatele (Dissection) . . . .	525	78 „	21 „
Turner and Porter (Skiagraphy) .	600	79 „	20 „

(b) **Incidence of the Two Types of Mastoid Process in 1000 Crania.**—Having established the accuracy of the skiagram as a means of demonstrating the two types of mastoid process, we proceeded to investigate their incidence in a large series of crania. The skulls utilised included not only those of the 300 Europeans already referred to, but a large number of crania belonging to various races inhabiting the Asiatic, African, American, and Australian continents, and the islands of the Indian and Pacific Archipelagoes. In the tables which follow, the results obtained in the whole series are given first, while those yielded by the white European peoples are placed underneath. This has been done for the purpose of special reference, as, in our clinical work, we are concerned, for the most part, with the white races.

It is obvious from a study of the figures in Table II. that the percentage of pneumatic processes in the European peoples is lower than in the other races examined, the difference being as much as 9 per cent. The explanation of this will be found in the section on Anthropology.

# Structural Type of the Mastoid Process

TABLE II.

*Cellular and Acellular Mastoid Types and the Occurrence of Asymmetry in 1000 Crania.*

Crania.	Cellular Processes.	Acellular Processes.
1000	1719 85 per cent.	281 14 per cent.
1000 { 300 (Europeans)	476 79 per cent.	124 20 per cent.
700 (other races)	1243 88 per cent.	157 11 per cent.

(c) **Symmetry and Asymmetry of Mastoid Types.**—Asymmetry of type has an important bearing upon the usefulness of the skiagram in the study of acute and chronic ear disease, as it is usually from a comparison of the shadow presented by each temporal bone that judgment is formed regarding the nature of the appearances observed on the diseased side.

*Anatomical asymmetry* of type may be due either to the presence of a pneumatic process on one side and an acellular form on the other, or, while both processes contain pneumatic spaces, the distribution of the cells is dissimilar on the two sides. Thus, the right mastoid may be pneumatic throughout the whole process, while the left may show cells limited in their distribution to the upper mastoid and outer antral wall, the lower mastoid being diploëtic or possibly sclerotic in structure.

Of the two varieties of asymmetry, that in which one process is acellular and the other pneumatic is the more commonly met with. In the 300 European crania, this variety occurred in 26, *i.e.* in 8 per cent. of the skulls. In the remaining 700 crania, it was present in 50, *i.e.* in 7 per cent. of the skulls. Hence, in the whole series of 1000 crania in which 120 skulls showed asymmetry, 76 or 7 per cent. had an acellular process on one side and a pneumatic on the other. The acellular type occurred more frequently in the right temporal bone than in the left, in the proportion of 47 to 29. The asymmetry of type in the remaining 44 skulls in the series was due to unequal distribution of the pneumatic cells in the two processes.

It must be obvious from what has been said that the variety of mastoid asymmetry, which consists merely in an unequal

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distribution of the cell spaces in the two processes, must have a clinical value which the other and more frequent variety does not possess. In acute middle-ear suppuration, for instance, the presence in the two skiagrams of pneumatic cells, although unequally distributed, admits of a comparison being made between the two shadows. This is not possible where one of the two processes is acellular in type, and, consequently, the term *clinical asymmetry* may be fittingly applied to this variety. Table III. gives a graphic representation of the relative percentage of the two varieties as they occur in the different skull groups. Clinical asymmetry as represented in the skiagram in the European crania occurs in only 8 per cent. of the skulls. The figure coincides with that given by Cheatle as the outcome of dissection. He found that gross asymmetry which would affect the value of an X-ray plate was present in about 7 per cent. of heads.

TABLE III.

*Anatomical and Clinical Asymmetry of Mastoid Types  
in 1000 Crania.*

Crania.	Anatomical Asymmetry.	Clinical Asymmetry.
1000 series	120 12 per cent.	76 7 per cent.
1000- 300 (Europeans)	45 15 per cent.	26 8 per cent.
700 (other races)	75 10 per cent.	50 7 per cent.

(d) **The Type of Mastoid and Asymmetry in Relation to Sex.**—Statistics in this connection are based upon the examination of 942 of the total crania examined, of which number 695 were male and 247 were female skulls. It was impossible to determine the sex in the remaining 58 crania. In the European crania the sex was determined in 285 instances. Table IV. gives the results of the examination.

It is obvious from the figures which follow that the sex of the skull does not influence either the relative frequency of the occurrence of the two types of mastoid process or their asymmetrical development. The percentage of the two types is virtually the same in both sexes, whether studied in the whole series of crania or in the European group.

# Structural Type of the Mastoid Process

TABLE IV.

*Cellular and Acellular Mastoid Types and their Asymmetry  
in the Two Sexes in 942 Crania.*

Crania.		Cellular Processes.	Acellular Processes.	Skulls with Asymmetrical Processes.
942	Males, 695 .	1194 85 per cent.	196 14 per cent.	81 11 per cent.
	Females, 247 .	433 87 per cent.	61 12 per cent.	30 12 per cent.
<i>Europeans.</i>				
285	Males, 196 .	310 79 per cent.	82 20 per cent.	32 16 per cent.
	Females, 89 .	144 80 per cent.	34 19 per cent.	12 13 per cent.

## *Summary of Anatomical Investigation.*

1. It is possible to recognise the cellular and acellular types of mastoid process in the skiagram of the skull. A correct interpretation of what is seen in the living head is not always possible when non-stereoscopic pictures are employed.

2. A mastoid process containing pneumatic spaces occurs, on an average, in 80 per cent. of European skulls, the acellular process in the remaining 20 per cent.

3. Anatomical asymmetry of the mastoid process in individual skulls occurs in 12 per cent. of a series of 1000 crania. The asymmetry in the majority of instances is due to a cellular process on one side and an acellular process on the other; in the remainder, both processes are cellular, but the cells are unequally distributed. Clinical asymmetry, therefore, is found in only 7 per cent. or 8 per cent. of the skulls.

4. The relative frequency of the occurrence of the two types of mastoid process and the incidence of asymmetrical development is virtually the same in both male and female crania.

*(To be continued.)*

## REPORT ON TWO HUNDRED CASES OF TONSILS AND ADENOIDS TREATED BY OPERATION.

By F. G. WRIGLEY, M.D., Hon. Surgeon, Manchester Ear Hospital,  
and G. E. ARCHER, M.B., Hon. Assistant Surgeon, Manchester Ear  
Hospital.

THE following is a record of 200 cases of tonsils and adenoids treated by operation in hospital practice. In collecting these cases no attempt has been made to select those showing the most favourable results; they have been taken consecutively from the hospital records. The interval between operation and final examination averages eighteen months, and no case has been included within one year of the operation. We consider that this period is sufficient to allow of the disappearance of those symptoms which might be expected to be relieved by operation, and, at the same time, to permit of the possibility of recurrence.

The indications for the operation included nasal obstruction and mouth breathing, recurrent lacunar tonsillitis and sore throats, frequent nasal colds, catarrhal ear disease, suppurative ear disease, enlarged cervical glands and quinsies.

*Preparation of the Patient.*—The majority were operated on as out-patients, coming to the hospital on the morning of operation and returning home after a few hours. We realise the advantages of detaining each case in hospital for a few days; but, owing to the shortage of beds, this has been impossible, and the former method is the only way of getting through the work. Patients over the age of 15 years and those living more than three miles from the hospital have all been detained at least for one night. The preparation of the patient has therefore been carried out in most cases by the person responsible for the child, and consists of light diet the day before operation, a purgative the night before, and a cup of tea or milk early in the morning of operation. The cases have been operated on about 9.30 A.M., and have been allowed to return home about 2.30 P.M., after being examined for hæmorrhage or other adverse symptom.

As regards the immediate result everything has been quite satisfactory, no case having been detained for hæmorrhage and none having been subsequently reported to us. All cases have been seen in the Out-Patient Department within two or three

# Tonsils and Adenoids treated by Operation

weeks of the operation. A few cases of earache have been reported, and one or two in which suppuration of the middle ear had taken place; these have occurred in patients who have returned home the same day, but the condition settled down without complication. In some of the older patients there has been a little reaction in the way of sore throats and a slight rise of temperature; this has been noticed in cases which had suffered from repeated sore throats and in which the tonsils were firmly adherent to the faucial pillars. In the majority of cases there was no reaction except a transient sore throat which passed off quickly, the patients being able to take solid food in twenty-four hours.

*Anæsthesia.*—The anæsthetic used as a routine has been C.E. mixture, sometimes with a little ethyl chloride. In a few cases, open ether has been employed.

*Method of Operating.*—In all cases the method of tonsillectomy described by Mr J. F. O'Malley was followed; the instruments used being Mr O'Malley's blunt tonsillotome and a caged adenoid curette of the St Clair Thomson pattern. Daylight illumination was used in all cases. As little swabbing as possible was done as we think it favours hæmorrhage and post-operative sore throat, by bruising the tissues and causing sloughing of the tonsillar bed. The central pad of adenoids was removed by the curette, and when necessary the nasopharynx further cleared by a curette from which the cage had been removed. No ring knife or other similar instrument has been used. Before the patient leaves the table we make certain that all hæmorrhage has ceased, and in no case had any measures to be taken to check it, either at the time of operation or later.

*After-treatment.*—In the great majority of cases no after-treatment has been carried out, the practice being to leave the throat alone as much as possible, but in some of the older patients where there was a local reaction it has been necessary to allow the use of mouth washes. The use of gargles has been avoided as being liable to cause pain and prevent rest of the operation area.

*Age Classification*—200 cases of tonsils and adenoids treated by operation.

2-5 yrs.	.	.	47 cases		11-15 yrs.	.	.	51 cases
6-10 yrs.	.	.	79 "		16-26 yrs.	.	.	23 "

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## *Indications for Operation.*

Nasal obstruction and mouth breathing in 128 cases. Tonsillitis and sore throats in 34 cases. Non-suppurative deafness in 93 cases. Suppurative otitis media in 39 cases. Enlarged cervical glands in 7 cases. Quinsy in 7 cases.

## *Results of Operation.*

Nasal obstruction, etc.—All symptoms were relieved except in three cases: (1) Deflected nasal septum; (2) narrow nasal passages due to bony formation; (3) recurrence of adenoids.

Tonsillitis, etc.—Symptoms were relieved in all cases.

Non-suppurative deafness—Symptoms disappeared in all cases except: four cases of old healed suppuration; two cases of catarrh of the middle ear, which are said to have improved; one case of otosclerosis, which is said to be worse.

Suppurative otitis media—Perforations dry and healed in all cases except: in one old mastoid operation; in two cases which have had no treatment since operation; in four cases which need a radical mastoid operation; and in four cases with very large perforation due to scarlet fever.

Enlarged glands—These disappeared in six cases, but are still present in one case.

Quinsy—All the cases were cured.

Post-nasal catarrh—This is present to a slight degree in three cases.

## *Local Results of Operation.*

Tonsils—A small portion of the lower pole of the tonsil was found to be present in six cases, but was giving rise to no symptoms.

Adenoids—There was a recurrence of adenoids in one case, which needed further operation; two other cases showed a very slight recurrence, but required no operative treatment.

Scarring—Slight scarring of the pillars was seen in eleven cases, which gave rise to no symptoms.

Deformity—Slight deformity of the soft palate was present in two cases.

*Conclusions.* — We consider the results very satisfactory, taking into consideration the speedy return of the patients to their homes after the operation. The great majority of the cases were children who, from the nature and surroundings of their homes, were recovering from an operation under very unfavourable conditions.

The results show that the tonsils completely removed do not recur, the presence of the lower pole in six cases being due



## Tonsils and Adenoids treated by Operation

to incomplete removal and not to recurrence. The examination of the naso-pharynx was by means of the post-nasal mirror, but where this was impracticable or inconclusive, the naso-pharynx was explored with the index finger. The recurrence of adenoids in three cases, only one of which needs further operation, is, we think, very satisfactory when the conditions are considered; the two cases not requiring operation had a small portion of adenoid tissue high up in the naso-pharynx which did not interfere with respiration and gave rise to no symptoms. The effects on the aural lesions were what would be expected, the recent perforations drying up and healing, and the mucous catarrhs resolving. The large perforations did not heal although some of them dried up, and those having bony necrosis and granulations were not affected by the operation.

The local results, that is the condition of the throat, were quite satisfactory; the scarring, when present, affected the anterior pillar and was very slight in degree. The two cases showing deformity of the palate showed a scar at the junction of the anterior pillar and the soft palate, and, instead of the normal crescentic fold, produced a slight distortion and irregularity, making the fold slightly angular in shape. This allowed of free movement, and, as far as could be ascertained, caused no symptoms.

## THE PATHOLOGICAL AND CLINICAL ASPECTS OF DEAF-MUTISM.

By J. S. FRASER, M.B., F.R.C.S.Ed., Surgeon, Ear and Throat  
Department, Royal Infirmary, Edinburgh.

*(Continued from page 75.)*

### CLINICAL EXAMINATION OF DEAF-MUTES.

THE classification of a given case of deaf-mutism as either congenital or acquired might appear to be a comparatively easy matter. No doubt if we could always obtain an accurate history of the case from the child's parents or doctor, the question of correct classification would be greatly simplified. Further, if we always obtained typical functional results for each given group of cases, *e.g.*, if a "developmental" case invariably had some remains of hearing and normal vestibular reactions, or if an "inflammatory" case always occurred after speech had been acquired and resulted in complete deafness and absence of response to rotation and caloric tests, it would be a simple matter to divide a number of deaf-mutes into their proper categories. The fact is, however, that we have to depend very largely on the statements of the child's parents—statements which are frequently quite unreliable—and on the hearing and vestibular tests, which are often ambiguous or difficult to carry out. Parents are very unwilling to admit that their children have been born deaf and state that they have spoken, simply because they have made babbling noises, or have picked up such syllables as "ma-ma" from watching the mother's lips and face. Some attribute the child's deafness to such causes as "fright during the mother's pregnancy," "operation for hernia," etc. Mothers deny that their children have ever had running ears and yet, on examination of the drumheads, perforations or scars are observed. Indeed otoscopic examination is by no means a reliable guide. The fact that a child is suffering from chronic middle-ear suppuration does not prove that the deaf-mutism has been caused by labyrinthitis of tympanic origin. A child born with a congenital abnormality of the cochlea and saccule may suffer from middle-ear suppuration. Case I., for example, was a "congenital" deaf-mute who died as a result of an intracranial complication of chronic middle-ear suppuration. On the other hand, as we have seen, the foetus may suffer from

# Pathological Aspects of Deaf-Mutism

meningitis *in utero*, or the infant may have a meningitic labyrinthitis before speech has begun to develop. Such cases would probably be regarded by the parents as instances of congenital deaf-mutism, whereas in reality the hearing defect was acquired. Case II. was looked upon by the boy's mother as one of congenital deafness, but microscopic examination showed that the cause of the deaf-mutism was bilateral labyrinthitis of tympanic or meningitic origin. For these reasons the writer has found it impossible to classify all the cases clinically examined into definite groups, and has therefore preferred to designate a large number as "doubtful."

During the last four years 140 children have been investigated at the Edinburgh Royal Institution for the Education of the Deaf and Dumb. Of these, 135 were deaf-mutes. In the remaining 5 cases the dumbness was apparently due to congenital aphasia. If we divide the 135 cases into the two well-known groups, we find that 56 cases were almost certainly congenital or developmental deaf-mutes. A further series of 18 cases was probably of congenital origin and one child showed cretinic deafness. This gives a total of 75 congenital cases. In the remaining 60 children deaf-mutism was apparently of acquired or inflammatory origin. These latter cases may be subdivided thus: (1) Middle-ear suppuration and (in most cases) labyrinthitis, 21; (2) meningitic labyrinthitis, 20; (3) congenital syphilis, 7; (4) traumatism, 1; (5) "doubtful cases," probably of acquired origin, 11.

## I. Congenital Cases (75).

(A) **Congenital Cases (56).**—Of these, 32 were males and 24 females. In 4 cases (almost 8 per cent.) the parents were related before marriage. In 24 cases there was a history of deafness in the family, but this statement must be qualified by the fact that in a number of cases there were two or more children of the same family in the institution. (Two families had each three children, and five families had each two children in the school.)

*Otoscopy* (56 cases = 112 ears).—Drumheads normal, 46; indrawn, opaque, and lustreless, 49; scars, 11; dry perforation, 5; perforation and discharge, 1.

*Functional Examination* (56 cases).—Total deafness, 24; slight remains of hearing, 15; considerable remains of hearing, 7; ten of the children could not be tested on account of

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extreme youth or poor mental development. The vestibular reactions were normal or practically normal in 39, reduced in 15, and not tested in 2. In several cases which gave no reaction to rotation, the caloric reaction was slower than normal, taking from 60 to 120 seconds.

**(B) Cretinic Deaf-Mutism.**—Only one case, a female, was regarded as an example of cretinic deafness. The tympanic membranes were slightly retracted. The child was too young for hearing tests. The vestibular apparatus reacted but could not be accurately tested.

**(C) Doubtful, probably Congenital Cases (18).**—In some cases of apparently congenital deaf-mutism, *i.e.*, cases in which the child has never shown any appreciation of sound, examination of the vestibular apparatus demonstrates that the rotation and caloric tests are negative. In such cases we are not able to exclude the possibility of intra-uterine or early post-fœtal meningitic labyrinthitis as the cause of deafness. On the other hand we know that in some congenital or “developmental” deaf-mutes the vestibular apparatus fails to react. For these reasons the writer considers it advisable to include this group of cases in the “doubtful” category, *i.e.*, as being probably of congenital origin, but with the reservation that at least some of them may be examples of deaf-mutism due to intra-uterine or early post-fœtal meningitic neuro-labyrinthitis.

Of the 18 cases in this group 10 were male and 8 female. In one instance the parents were related before marriage, and in another there was a history of deafness in the family.

*Otосcopy.*—Of the 36 drumheads 14 were normal; 19 indrawn, opaque, and lustreless; one showed chalk patches and two scars.

*Functional Examination.*—Ten of the cases apparently had no hearing, one had slight remains, one considerable remains of hearing, and six could not be tested. The vestibular reactions were normal in one case, reduced in two, absent in twelve, and not tested in three. (Two of the three children were mentally defective.)

## II. Acquired Cases (60).

**(A) Suppurative Otitis Media, Scarletina, Measles, etc. (21).**—Thirteen were males and 8 females. In one case the parents were related before marriage (second cousins), and in 3 there was a history of deafness in the family.

# Pathological Aspects of Deaf-Mutism

*Cause of the Deafness.*—Scarlatina, 9; measles, 3; whooping-cough, 1; suppurative otitis media of unknown origin, 8. (It may be hoped that, with the appointment of an otologist to all Fever Hospitals throughout the country, the number of cases of deaf-mutism resulting from scarlatina, measles, etc., will greatly diminish.)

Fifteen of the children had learnt to speak before the onset of deafness. Three became deaf before the age of speech. In the remaining 3 cases there was no history on this point. Six of the children suffered from purulent nasal catarrh.

*Otoscopy.*—Of the 42 drumheads, 2 were indrawn and opaque; 15 showed perforations and chronic middle-ear suppuration; 8 dry perforations; 7 showed scars in the tympanic membrane. In 9 cases the radical mastoid operation had been performed. In one case the meatus was stenosed.

*Functional Examination.*—Seven of the children had slight remains of hearing and 3 considerable remains. Nine were totally deaf and 2 could not be tested. The vestibular reactions were normal in 7, reduced in 3, and absent in 11 cases.

In 5 of the cases some remains of hearing were present, and the vestibular response was normal or only slightly reduced. (Four of these children had learned to speak before the occurrence of deafness.) It would appear from these results that in certain cases middle-ear disease alone may produce deaf-mutism).

**(B) Meningitis (20).**—Twelve were males and 8 females.

*Supposed Cause of Meningitis.*—In one case pneumonia, in 2 measles, and in 3 whooping-cough. In most of the others epidemic cerebro-spinal meningitis was the cause of deafness. (The percentage of cases of deaf-mutism due to meningitis varies considerably, depending largely on the occurrence or absence of an outbreak of "spotted fever" in the country during recent years. In this country the last epidemic occurred during the years 1906-7.) In 10 cases deafness occurred after speech had been acquired. Squint was present in 3 of the cases, while one child was blind in one eye.

*Otoscopy.*—Of the 40 drumheads, 10 were normal; 25 showed indrawing and opacity; 2 showed scars. In one there was a moist and in another a dry perforation. The radical operation had been performed on one ear.

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*Functional Examination.*—In 14 cases total deafness was present and the other 6 could not be tested. Rotation and caloric tests produced no reaction in 17 cases; the other 3 children were too young for this examination.

(C) **Congenital Syphilis** (7).—Seven cases were apparently due to this disease (4 males and 3 females). In one case the parents were related (cousins). In 2 cases the father of the patient was deaf. The Wassermann reaction was tested in only 4 of the 7 cases, and was found to be positive in 3 and doubtful in 1. In the other 3 cases the reaction was not tested, but in 2 there were well-marked signs of congenital syphilis—the teeth being of the Hutchinson type. In the remaining case the mother gave a definite history of miscarriages and still-births before the birth of the patient. The eyes were examined in 6 cases, and it is noteworthy that in only 2 was interstitial keratitis present.

*Otology.*—In no case was the tympanic membrane normal. Ten of the 14 drumheads were indrawn, opaque, and lustreless, and 4 showed scars.

*Functional Examination.*—Two of the children were totally deaf, 2 had slight remains of hearing, and 2 considerable remains. One case could not be tested. The vestibular reactions were normal in 1, reduced in 2, and absent in 4 cases.

(D) **Traumatism (fracture of Cranial Base)**.—Only one case was due to this cause, a girl who suffered from a head injury after speech had been acquired. The tympanic membranes were normal, the child was totally deaf and there was no vestibular response.

(E) **Doubtful Cases, probably Acquired** (11).—Seven were males and 4 females. In one instance the parents were related before marriage (cousins). In 3 there was a history of deafness in the family.

*Supposed Cause of Deafness.*—Meningitis, 3; convulsions, 1; middle-ear suppuration, 1; fright during mother's pregnancy, 1; not stated, 5. Two of the cases were regarded as possibly due to otosclerosis.

Seven of the children had learned to speak before deafness developed. In 3 cases the deafness was said to have come on at a very early age and was probably due to meningitis, and in 1 no history was obtained.

*Otology.*—Five of the 22 drumheads were normal, 1 showed a scar, 16 were indrawn, opaque, and lustreless.

# Pathological Aspects of Deaf-Mutism

*Functional Examination.*—Seven of the children had considerable remains of hearing; 2 were totally deaf and 2 were not tested. The vestibular reactions were normal in 3, reduced in 5, and absent in 3.

## **Congenital Aphasia.**

Five children were regarded as cases of congenital aphasia. Of these, 3 were females and 2 males. The drumheads were normal in 4. Three of the children had apparently normal hearing for tuning-fork tests, while another heard to a considerable extent. In the remaining case examination was impossible on account of the feeble mental development of the child. In all cases the vestibular apparatus gave normal reactions.

## **Review of Literature dealing with the Clinical Investigation of Deaf-Mutism.**

*Sex.*—Nager points out that in congenital deaf-mutism the sexes are nearly equal, but in acquired cases the boys greatly outnumber the girls. He suggests that boys may suffer more from fevers than girls.

*Breathing Curve.*—Froeschels has compared the breathing curve of normal and deaf-mute children and found that in the former there was a complete correspondence between the movements of the thoracic and abdominal muscles. In deaf-mutes, on the other hand, he noted that the excursion of the abdominal wall was at times much greater, and at others much less, than that of the chest. Breath control was therefore faulty in deaf-mutes and accounted to some extent for the bad accentuation of their speech. Stern even claims that observation of the breathing curve makes possible a differential diagnosis between congenital and acquired deaf-mutism.

*Pigmentary and Other Anomalies.*—Hammerschlag has demonstrated a deaf-mute with a white strip of hair stretching from before backwards. Many other degenerative stigmata were present, including high palate, undescended testicle, ataxia of upper extremities, *gait du vélocipède*, and complete idiocy. The iris was light blue. Rotatory nystagmus was present, associated with congenital amblyopia. The ocular fundus was normal. Hammerschlag agrees with Oppikofer that the only connection between pigmentary anomalies and congenital deafness is the fact that both conditions are to be

regarded as degenerative stigmata. Alexander has pointed out that morphologically the labyrinth pigment is entirely different from the skin or retinal pigment. On the other hand, there is a close morphological relationship between the labyrinthine and choroidal pigment.

*Blood Relationship of Parents.*—Hammerschlag holds that a relatively large percentage of deaf-mutes comes from consanguineous marriages, and that the percentage is still greater if one only regards congenital deaf-mutes. The marriages from which deaf-mutes arise are from twice to nine times as frequently consanguineous as the marriages which result in normal hearing children. In cases in which there was only one deaf-mute in a family the marriage was consanguineous in 14 per cent.; in cases with two deaf-mutes, 22 per cent.; in cases with three or more, 55 per cent. Nager states that from 6 to 14 per cent. of deaf-mutes have parents who were related before marriage; Bezold, 6.6 per cent.; Yearsley, 7 per cent.; Guglielmetti, 7.4 per cent.; Ukoto, 19 per cent.; Schoenlank, 20 per cent.

*Heredity.*—The important work of Kerr Love has so recently appeared in this Journal (vol. xxxv., 1920, p. 263) that it is not necessary to make further reference to it. Nager points out that direct heredity is rare and that only one out of a hundred deaf-mutes has deaf-mute parents. On the other hand, if both parents are deaf-mutes from birth, 26 per cent. of their children are deaf-mute. Further, in 25 per cent. of the families in which deaf-mutism occurs, more than one child is affected. Fay found that the percentages of deaf children in a family were as follows: if both parents were congenitally deaf, 25.9; if one parent was congenitally deaf and the other adventitiously deaf, 6.5; if both parents were adventitiously deaf, 2.3; if one parent was congenitally deaf and the other hearing, 11.9; if one parent was adventitiously deaf and the other hearing, 2.2. If both parents were congenitally deaf and both had deaf relatives, 30.3. Guglielmetti among 31 congenital cases found only one with direct heredity (3 per cent.). Indirect collateral heredity, however, was noted in 38.7 per cent. Among twenty-seven families investigated there were eight with several deaf-mutes. Mygind found that there was a family occurrence of deaf-mutism in 15 per cent. of families with deaf-mute children. Bezold gave the figure of 16 per cent. and Schoenlank 32 per cent. Falkowitsch states that of 16 cases of congenital



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deaf-mutism, 14 showed a hereditary taint, *i.e.*, deaf-mutism among relations. Neumann has demonstrated a family of thirteen children, of whom four were congenital deaf-mutes, three were markedly deaf, and six were normal. The parents were not related. E. Urbantschitsch, in discussing this case, recalled a family in which the father and mother and two children were all deaf-mutes. The eldest child was totally deaf on one side but only hard of hearing on the other. Ruttin has had a similar case.

*Proportions of Congenital and Acquired Deaf-Mutism.*—If we gather together the statistics compiled by Alexander, Bergh, Guglielmetti, Jouet, Kraft, Lainois, and Chavanne, Kerr Love, Mygind, Nager, Schoenlank, and Yearsley, we obtain a percentage of 52 congenital cases, 43 acquired, and 5 doubtful. The percentage of cases in each group depends upon the region investigated. In Switzerland, for example, there are many more congenital than acquired cases, on account of the presence of endemic cretinism.

*Causes of Acquired Deaf-Mutism.*—In attempting to ascertain the causes of acquired deaf-mutism we at once met with the difficulty that the number of cases examined by many writers is extremely small. For this reason it appears best to assemble the figures given by various writers and to state the percentages on this basis. Accordingly, the writer has taken the figures given by Bezold, Bock, Castex, Falkowitch, Guglielmetti, Jouet, Kümmel, Lemake, Mygind, Nager, Siebenmann, Schoenlank, Urbantschitsch, and Yearsley. From these, it appears that of each hundred cases of acquired deaf-mutism, 36 were due to meningitis, 16 to scarlet fever, 10 to measles, 10 to pneumonia, 11 to syphilis, 4 to trauma, 3 each to whooping-cough, mumps, and typhoid fever, and 2 each to influenza and pneumonia.

*Congenital Syphilis.*—According to the findings of different investigators the percentage of cases of deaf-mutism attributed to congenital syphilis varies from 2.5 to 18.6. Thus Castex examined 719 cases and only found 18 with definite signs of congenital syphilis (2.5 per cent.). Yearsley examined 500 children in the L.C.C. deaf-mute schools and found that only 3.5 per cent. were syphilitic. Among 225 acquired cases he found 17 due to congenital syphilis (7.5 per cent.). Siebenmann gives the percentage of 5.6 as representing the number of cases of deaf-mutism in Basel due to congenital syphilis. Bock examined 103 children in a deaf-mute

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institution. None had obvious signs of syphilis, but a markedly positive "Wassermann" was found in 9; in 6 of these the deaf-mutism was regarded as occurring before birth, or at least as acquired in the first years of life. Urbantschitsch examined the Wassermann reaction in 125 deaf-mutes with the following results:—negative, 86 per cent.; markedly positive, 6 per cent.; complete reaction, 8 per cent. Kümmel examined 235 cases and found that 15 were definitely syphilitic. Jouet states that of 182 cases of deaf-mutism examined, 34 were due to syphilis. Twenty out of 94 "congenital" cases and 14 out of 88 acquired were attributed to this cause. The work of Kerr Love and Browning has already been reported in this Journal (vol. xxviii., 1913, p. 159). It is important to note that, according to Browning, the Wassermann reaction does not discover all cases of congenital syphilis, *i.e.*, a negative reaction cannot be taken as complete proof that syphilis is not the cause of deafness.

During the year 1918, Dr Wang examined the Wassermann reaction in 82 of the 88 children then present in the Edinburgh Royal Institution for the Education of the Deaf and Dumb. In only three instances was the reaction positive and in one doubtful, so that, even if we include the doubtful case, the proportion of deaf-mutism due to congenital syphilis was only about 5 per cent.

### Functional Examination of Deaf-Mutes.

(A) **Cochlear Apparatus.**—Alexander agrees with Itard's clinical classification of deaf-mutism, as follows:—Group I. Conversation voice heard at 6 feet. II. Raised voice heard close to ear. III. Vowel hearing. IV. Loud noises heard, *e.g.*, rattle, trumpet, whistle, or hand-clapping. V. Total deafness. Alexander states that Class V. can be excluded as early as six months, provided that the infants are otherwise mentally normal. Group III. can only be satisfactorily examined at the age of two years and Groups I. and II. at the age of four to five years. Alexander lays stress on the gait of deaf-mutes in determining the presence of hearing remains. He calls attention to the fact that the totally deaf drag their feet because they cannot hear the unpleasant sound thus produced.

Denker divides deaf-mutism into two groups:—(A) Total deafness which may be either unilateral or bilateral; (B) Partial deafness. This latter group again has two sub-groups—(1) with

## Pathological Aspects of Deaf-Mutism

small remains of hearing not available for education by the ear, and (2) considerable remains of hearing. According to this method of classification Schoenlank found that among the 64 children (128 ears) examined, Group (A) included 22 ears, *i.e.*, 18 per cent., and Group (B) 106, 82 per cent. Group (B2) contained 59 ears. It is interesting to note that Schoenlank could only carry out tuning-fork tests on 20 of the 64 children. In 19 of these the affection was in the inner ear; in 1 only it was in the middle ear.

Guglielmetti has examined 59 cases (118 ears). Eight of the patients were totally deaf on both sides (1 congenital and 7 acquired). Ears totally deaf, 22 (18 per cent.). There were 31 cases of congenital deafness (62 ears), of which 6 ears (9 per cent.) were totally deaf. Of the 26 acquired cases (52 ears), 16 (30 per cent.) were totally deaf.

Kano has examined 75 cases, of whom 38 were totally deaf. He states that hearing tests in various institutions show 36 per cent. of cases totally deaf. Brock states that in the great majority of cases total bilateral deafness is acquired. The rotation and caloric tests are usually negative in such cases. Kerr Love holds that 25 per cent. of deaf-mutes have remains of hearing. Bezold has examined 276 cases of deaf-mutism, and among these found that only 79 were absolutely deaf. He lays great stress on the necessity for classification of deaf-mutes for educational purposes, and upon the segregation of those with remains of hearing from the totally deaf.

Schmeigelow has examined 148 children and found that 51 (28 per cent.) were totally deaf, while 103 (72 per cent.) had some hearing. He remarks that the percentage of the totally deaf varies according to the method employed in testing the children.

**(B) Vestibular Apparatus.**—Alexander states that in cases of deaf-mutism in which the history is doubtful, we can with certainty assume that the case is congenital if the static labyrinth is excitable. Further, we may say with great probability that, if remains of hearing are present, the case is congenital.

Frey and Hammerschlag examined 93 children. Of these 50 per cent. gave a positive and 45 per cent. a negative reaction to rotation. Five per cent. were doubtful. Of the 93 cases 45 were regarded, according to the history of the parents, as acquired, and of these only 27 per cent. gave a positive

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reaction, while 64 per cent. were negative and 9 per cent. doubtful. Among the 48 congenital cases 72 per cent. gave a positive reaction, 26 per cent. negative, and 2 per cent. doubtful. From the 45 acquired cases they eliminated those in which the deafness was said to have come on during the first two years of life, and in the group of 48 so-called "congenital" cases they accepted only those with multiple deafness in the family, and those with congenital anomaly of the eyes. Thus the original group of 45 acquired cases was reduced to 26, and the congenital group of 48 to 21. The final result was as follows:—Among the 26 acquired cases only 15 per cent. showed a positive reaction, 81 per cent. negative, and 4 per cent. doubtful. Among the 21 congenital cases 71 per cent. were positive, 24 per cent. negative, and 5 per cent. doubtful.

Tweedie examined 33 cases: 8 had some remains of hearing, and of these 6 had normal rotation and caloric reactions. There were 25 patients totally deaf: of these 12 had no vestibular reaction. Of the remaining 13 only 1 gave a normal response.

Alexander and Kreidl found that in congenital cases 68.8 per cent. gave normal galvanic reactions. Among acquired deaf-mutes, on the other hand, only 29 per cent. gave normal reactions.

Kano has examined 75 cases. Of these 20 per cent. showed spontaneous nystagmus. The rotation test was negative in 30 per cent. and reduced in 28 per cent. The caloric test—negative, 42 per cent.; reduced, 33 per cent. Galvanic test—moderate, 14 per cent.; marked, 9 per cent.; negative, 42 per cent.

Hammerschlag examined 88 deaf-mutes, and by a process of exclusion arrived at the figure 23 as representing the truly congenital or hereditary degenerative cases. He found that 22 of the 23 reacted to the galvanic current; only one girl, suffering from retinitis pigmentosa, did not react. Hammerschlag concludes that the pathological changes in the static organ of deaf-mutes is usually less marked than in dancing mice. A small number of hereditary deaf-mutes gave a negative reaction to rotation tests but a positive reaction to the galvanic current. This again confirmed the findings of Alexander and Kreidl in dancing mice. A still smaller number gave no reaction either to rotation or galvanic tests, thus showing an even more severe affection of the static apparatus than in the dancing mice hitherto examined. Hammerschlag believes, however, that more extensive examination would show a similar condition among these mice.

# Pathological Aspects of Deaf-Mutism

Pollak has examined 43 deaf-mutes and found 23 with normal and 20 with absent galvanic reactions, *i.e.*, 53 per cent. positive and 47 per cent. negative. Of the 43 cases 19 were congenital, and of these 16 (86 per cent.) had normal and only 3 (14 per cent.) had absent galvanic reaction. Of the 24 cases of acquired deaf-mutism 17 (71 per cent.) had absent and 7 (29 per cent.) had normal galvanic reaction.

Bárány has examined the counter-rolling of the eyes in normal people and deaf-mutes. By counter-rolling, Bárány understands the rotation of the eyes round a sagittal axis on tilting the head to one side or the other. (Breuer attributed this counter-rolling to the statolith apparatus.) Bárány found that in normal people the average was  $16.8^{\circ}$ ; in deaf-mutes with normal galvanic reaction it was  $18^{\circ}$ ; whereas in deaf-mutes who did not react to galvanism it was only  $7.8^{\circ}$ .

Karl Beck has investigated 30 deaf-mutes and 30 healthy children in regard to swimming and diving, and has come to the conclusion that disorientation of deaf-mutes in the water is not proved. Dan M'Kenzie agrees with this result.

In conclusion, the writer wishes to express his sincere thanks to Dr Logan Turner and to Professor F. R. Nager for their kind advice in the preparation of this paper; to Mr T. H. Graham, Librarian to the Royal College of Physicians, Edinburgh, for his help in connection with the references quoted; to Mr J. S. Barker and Miss Martin of the Edinburgh Royal Institution for the Education of the Deaf and Dumb for their assistance; to Mr Richard Muir for the photomicrographs; and finally, to the Carnegie Trust for defraying the expense of the illustrations.

For the discussion on this paper at the Section of Otology, 20th May 1921, see p. 143.

## BIBLIOGRAPHY.

*Abbreviations.*—*A. f. O.* = *Archiv für Ohrenheilkunde.*

*C. f. O.* = *Centralblatt für Ohrenheilkunde.*

*J. L. R. O.* = *Journal of Laryngology, Rhinology, and Otology.*

*M. f. O.* = *Monatschrift für Ohrenheilkunde.*

*Z. f. O.* = *Zeitschrift für Ohrenheilkunde.*

Alexander, *A. f. O.*, 1904, lxi., 183; *A. f. O.*, 1909, lxxviii., 54; *C. f. O.*, 1904, ii., 134; *Ohrenheilkunde des Kindesalters*, 1914, Lippincott, p. 234; *Anat. der Taubstum.*, ii. 1905; *J. L. R. O.*, 1915, xxx., 372; *M. f. O.*, 1906, xl., 489. Alexander and Kreidl, *Arch. f. d. Physiologie*, lxxxi., 1900, 341.

Alexander and Neumann, *Anat. der Taubstum.*, vi., 1909. Alt, *M. f. O.*, 1908, xlii., 2. Ballantyne, *Antenatal Pathology* (The Fœtus), Edinburgh, 1902, p. 218. Bárány, *C. f. O.*, 1905, iii., 349. Bezold, *Deut. Med. Wochen.*, No. 48, p. 1764 ; *Lehr. des Ohrenheilk.*, J. F. Bergmann, Wiesbaden, 1906. Bergh, *C. f. O.*, 1919, xvi., 179. Beck, *Zeit. f. Sinnesphysiologie*, xlv., 362. Bircher, *Der endemische Kropf, etc.*, Basel, 1883. Bochdalek, *Medizin. Jahr. des Osterr. Staates*, Band xl., p. 132. Bock, *Müncher Med. Wochen.*, 1910, 2083. Brouwer, *C. f. O.*, 1909, vii., 552. Brock, *A. f. O.*, 1907, lxx., 222 ; *ibid.*, 1907, lxxi., 56 ; *ibid.*, 1920, cv., 135. Castex, *J. L. R. O.*, 1908, xxiii., 424 ; *ibid.*, 1915, xxx., 371. Castex and Marchand, *C. f. O.*, 1906, iv., 212. Citelli, *Archiv. Ital. di Otologia*, xvii., Fasc. 4. Denker, *Trans. Seventeenth Internat. Cong. of Med.*, London, 1913, Section of Otology, p. 499. *C. f. O.*, 1910, viii., 475 ; *ibid.*, 1911, ix., 426 ; *Anat. der Taubstum.*, iv., 1907 ; *ibid.*, v., 1908 ; *J. L. R. O.*, 1915, xxx., 370. Donaldson, *Z. f. O.*, 1892, xxiii., 174. Downie, Walker, *Z. f. O.*, 1897, xxx., 236. Eschweiler, *C. f. O.*, 1907, v., 385. Edinger, *Deut. Med. Wochen.*, 1905, 137. Frey and Hammerschlag, *C. f. O.*, 1904, ii., 438 ; *Verhandl. der Deutsch. Otol. Gesel.*, 1904, xiii., 51. Freer, *Jahrb. f. Kinderheilkunde*, lxvi., 188. Falkowitsch, *C. f. O.*, 1906, iv., 21 ; Diss. Bern, 1905. Falls, *Z. f. O.*, 1886, xv., 303. Froeschels, *M. f. O.*, 1910, xlv., 1241 ; *Med. Klin.*, 1914, No. 7, 178. Field, *Diseases of the Ear*, 1879, p. 82. Friedrich, *Verhandl. Deutsch. Naturf. und Aertze zu Dresden*, 1907, 356. Fay, *Marriages of the Deaf in America*, The Volta Bureau, Washington, 1898, p. 134. Goerke, *C. f. O.*, 1910, viii., pp. 385 and 425 ; *Anat. der Taubstum.*, 1907, iii. Guglielmetti, *C. f. O.*, 1913, xi., 27. Diss. Zurich, 1912. Gradenigo, *A. f. O.*, xxv., 46 and 237. Gowers, *Lancet*, April 1902. Gray, *J. L. R. O.*, 1910, xxv., 225. Hammerschlag, *M. f. O.*, xiii., Heft 11 ; *C. f. O.*, 1904, ii., 134 ; *ibid.*, 1905, iii., 329 ; *ibid.*, 1906, iv., 257 ; *A. f. O.*, 1906, lvi., 161 ; *Z. f. O.*, 1904, xlvii., 147, 381 ; *Wien Klin. Rundschau*, 1904, No. 1 ; *Wien Med. Wochens.*, 1908, No. 4. Haike, *A. f. O.*, 1902, lv., 36. Habermann, *A. f. O.*, 1901, liii., 52 ; *ibid.*, 1904, lxiii., 201 ; *C. f. O.*, 1904, ii., 437. Hoelzel, *Z. f. O.*, 1903, xliii., 167. Hegener, *Verhandl. d. deutsch. Otol. Gesel.*, in Basel, 1909, p. 24. Hane, Kiiichi, *Z. f. O.*, 1913, lxix., 69. Herzog, *Passow's Beiträge*, 1913, vi. 344. Hartmann, *Taubstummheit und Taubstummtenbildung*, 1880. Ibsen and Makeprang, *A. f. O.*, xxx., 76-118. Iwanow, *A. f. O.*, 1908, lxxv., 309. Itard, *Traité des Maladies de l'Oreille*, Paris, 1821. Jouet, *L'Oto-Rhino-Laryngol. Internat.*, 1921. Kerr Love, *J. L. R. O.*, 1920, xxxv., 263 ; *ibid.*, 1921, xxxvi., 29 ; *Trans. Glasgow Pathol. and Clin. Soc.*, 8th January 1906 ; *Deaf-Mutism*, Maclehose, Glasgow, 1896, 67. Kerr Love and Browning, *J. L. R. O.*, 1913, xxviii., 159. Kümmel, *C. f. O.*, 1912, x., 36. Kano, *Z. f. O.*, 1910, lxi., 28 and 284. Krafft, *C. f. O.*, 1911, ix., 41. Kocher, *Deutsche Zeitschr. f. Chirurgie*, 1892. Katz, *A. f. O.*, 1897, xliii., 166 ; *C. f. O.*, 1904, ii., 437 ; *Verhandl. der Deutsch. Otol. Gesel.*, 1904, xiii., 31 ; *Z. f. O.*, 1902, xli., 89. Koerner, *Z. f. O.*, 1905, l., 98. Kalenda, *Z. f. O.*, 1910, lx., 229. Lucæ, *A. f. O.*, xv., 275. Lindt, *Deutsch. Arch. f. Klin. Med.*, 1906, lxxxvi., 145. Linck, *Anat. der Taubstum.*, 1909, vi., 27. Mannasse, *Z. f. O.*, 1906, lii., 1 ; *ibid.*, 1909, lviii., 105 ; *A. f. O.*, 1914, xcv., 145. Moos and Steinbrügge, *Z. f. O.*, 1886, xv., 87. Moos, *Z. f. O.*, 1892, xxiii., 1. Mayer, *A. f. O.*, 1908, lxxvii., 189 ; *ibid.*, 1910, lxxxiii., 157 ; *M. f. O.*, 1911, xlv., 257 and 421 ; *Z. f. O.*, 1920, lxxx., 175. Michel, *Gazette*

# Pathological Aspects of Deaf-Mutism

*Médicale de Strassbourg*, 1863, 55. Mygind, *Z. f. O.*, 1891, xxii., 196; *ibid.*, 1892, xxiii., 217; *ibid.*, 1893, xxiv., 103; *J. L. R. O.*, 1915, xxx., 369; *Deaf-Mutism*, London, 1894. Nager, *Schweiz. Rundschau. f. Medizin*, 1919, No. 1; *Z. f. O.*, 1903, xliii., 234; *ibid.*, 1907, liv., 217 and 229; *ibid.*, 1917, lxxv., 349; *ibid.*, 1920, lxxx., 107; *C. f. O.*, 1919, xvi., 62; *Verhandl. der Deutsch. Otol. Gesel.*, 1906; *Die Taubstummheit*, Akademische Antrittsvorlesung, 1905. Neumann, *C. f. O.*, 1912, x., 32. Oppikofer, *Z. f. O.*, 1903, xliii., 177 and 192; *ibid.*, 1913, lxvii., 143; *ibid.*, 1915, lxvii., 1. Politzer, *Anat. der Taubstum.*, 1904, i., 17; *Diseases of the Ear*, London, 1902; *Z. f. O.*, 1894, xxv., 309. Panse, *A. f. O.*, 1905, lxiv., 118; *Anat. der Taubstum.*, 1911, viii. Pritchard, *J. L. R. O.*, xxv., 1910, 46. Quix, *C. f. O.*, 1911, ix., 173; *ibid.*, 1919, xvi., 144. Siebenmann, *Verhandl. der Deutsch. Otol. Gesel.*, xiii., 1904, 17; *Anat. der Taubstum.*, 1904, i., 1; *C. f. O.*, 1912, x., 37; *Z. f. O.*, 1903, xliiii., 216; *Anat. und Patholog. der Taubstummheit*, J. F. Bergmann, Wiesbaden, 1904. Siebenmann and Bing, *Z. f. O.*, liv., 1907, 265. Stein, *Z. f. O.*, 1917, lxxvi., 66 and 129; *ibid.*, 1918, lxxvii., 129; *Anat. der Taubstum.*, 1906, iii., 13. Schlittler, *Z. f. O.*, 1917, lxxv., 309. Schwartz, *A. f. O.*, v., 292. Schoenemann, *Anat. der Taubstum.*, 1910, vii. Scheibe, *Z. f. O.*, 1891, xxii., 11; *ibid.*, 1895, xxvii., 95 and 100; *Verhandl. der Deutsch. Otol. Gesel.*, 1899. Schwabach, *Z. f. O.*, 1904, xlviii., 293; *Anat. der Taubstum.*, 1907, iv.; *Verhandl. der Deut. Otol. Gesel.*, 1904, xiii., 33. Spira, *M. f. O.*, 1914, xlviii., 354. Steinbrügge, *Z. f. O.*, xvi., 229. Stern, *M. f. O.*, 1912, xlv., 257. Schoenlank, *Schweizerische Rundschau für Medizin*, 1920, No. 3. Schmiegelow, *M. f. O.*, 1902, xxxvi., 239; *C. f. O.*, 1903, i., 483. Tweedie, *J. L. R. O.*, 1908, xxiii., 592. Uchermann, *Z. f. O.*, 1892, xxiii., 70. Urbantschitsch, E., *C. f. O.*, 1906, iv., 191; *ibid.*, 1907, v., 150; *ibid.*, 1910, viii., 417; *Z. f. O.*, 1910, lx., 160. Virchow, *Virchow's Archiv.*, xxx., 228. Watsuji, *Anat. der Taubstum.*, 1904, i., 5. Wagenhäuser, *A. f. O.*, 1899, xlvi., 33. Yokota, *C. f. O.*, 1912, x., 443. Yearsley, *Annals of Otolaryngology, etc.*, Sept. 1912, xxi.; *J. L. R. O.*, 1910, xxv., 181; *ibid.*, 1920, xxxv., 270. Young (Gavin), *J. L. O.*, 1921, xxxvi., 524.

## CLINICAL RECORD

### A CASE OF FOREIGN BODY IN THE LEFT BRONCHUS, REMOVED BY LOWER (TRACHEAL) BRONCHOSCOPY.

By J. S. FRASER, M.B., F.R.C.S.E.

THE issue of this Journal for January 1922 contains a letter from Dr Thomas Guthrie, pointing out the advantages of lower bronchoscopy in certain cases. The following case is recorded in support of the view advanced by Dr Guthrie.

A. W., male, aged 5 years, admitted to the surgical wards of the Royal Infirmary, Edinburgh, 27th May 1920. The surgeon in charge informed the writer that radiographic examination showed a foreign body in the trachea, and, further, that the body moved up and down on respiration. No history was obtained as to how the foreign body had been inspired into the lower air passages. After the usual preparation a general anaesthetic was given, and the Brüning bronchoscopic tube passed through the larynx. A large blue bead was at once seen in the trachea. The central hole in the bead was easily observed. The operating table was tilted into the Trendelenberg position, when the bead rolled up against the distal end of the tube, but was too big to pass into it. Accordingly the bead was caught with slender bronchoscopic forceps, but, on attempting to withdraw tube, forceps and bead together, the foreign body escaped on several occasions. Later, when the child was laid flat on the table, the bead entered the right main bronchus. Here it was again grasped with the forceps, but again it slipped out, and on this occasion entered the left bronchus. The examination was discontinued at this point. The child was sent back to the surgical department, and the surgeon in charge considered the question of thoracotomy, but decided to permit another attempt at removal in the Ear and Throat Department. A second radiogram showed the bead in the left bronchus. On the 14th of June 1920 chloroform was given, and the bronchoscope passed as before. Again two or three attempts by upper bronchoscopy failed to remove the bead. Accordingly tracheotomy was performed, and a small direct laryngoscopic tube spatula passed through the tracheotomy opening. It was then easy to grasp the bead with the slender forceps and withdraw it. The subsequent history of the case was quite uneventful. After removal it was seen that the bead was lemon-shaped and too large to pass through the bronchoscopic tube even when its bulk was not increased by the addition of the blades of the forceps.



# Tracheotomy Tube and Forceps

In recording this case the writer desires to state his agreement with the second and third paragraphs of Dr Guthrie's letter, in which he states that in lower bronchoscopy it is possible to employ a wider and shorter tube than that available for upper bronchoscopy. It is certainly of very great value to the "average operator" to work through as large a tube and to get as near to the foreign body as possible.

## A NEW TRACHEOTOMY TUBE AND FALSE MEMBRANE FORCEPS.

By A. CUELEY, M.R.C.S., L.R.C.P.

I HAVE had the tracheotomy tube, illustrated here (Fig. 1), made with the idea that the cleaning would be much more easily done; that when introducing it the pilot would not stop the child breathing; and that, owing to its greater length, the point would not tend to come out of the trachea in patients with fat necks.

The shield and outer tube in the old Parker's pattern were attached and were difficult to clean; it was impossible to get under the flange of the

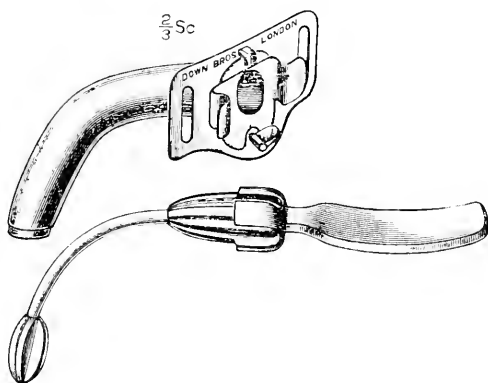


FIG. 1.

outer tube, and the loops and raised edge of the shield made it difficult to clean this part properly.

In the new tube the shield is made of stronger gauge silver and quite smooth, except for the hook which retains the outer tube, and which has only holes for the outer tube and tapes. The outer tube has a small notch at one side near the front; the tube can be turned round, and as the hook passes through the notch the tube can be removed and properly cleaned.

The catch in front of the outer tube which turns and retains the inner

## Tracheotomy Tube and Forceps

tube has always been a weak point in Parker's tubes ; it was liable to become loose and sometimes came out. This is now strengthened; instead of leaving the catch merely to work in a hole in the thin flange of the shield, I have had it strengthened by inserting a fixed pin for the catch to turn upon, while the new catch itself is made of a reasonable size which can be taken hold of.

The inner tube is slightly longer than the outer tube and it has no raised wire loops ; these were only necessary on the Parker tube in order to take it out. On my new tube the edges of the flange on either side are extended and turned up, and are therefore much easier to clean than the loops.

As the pilot in the old tube was solid, the child could not breathe when

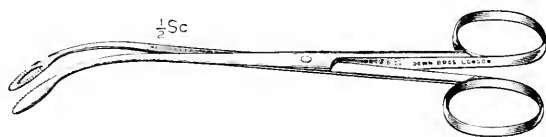


FIG. 2.

it was in the cannula. The new pilot has the cross-section of an X, and thus four spaces are left, allowing the child to breathe quite easily whilst it is being introduced : moreover, while the child is breathing through the tube the latter must obviously be going into the trachea.

The handle of the pilot is of such a length that it can be held with two fingers and the thumb.

The Tracheal Forceps (Fig. 2), which were introduced by my late Superintendent, Dr McCombie, with the object of removing membrane or inspissated mucus, have been found too thick for passing down the trachea of a small child ; I have had them made much thinner, and the joint has been brought nearer the handles, so as to prevent the latter from being held closed when the blades are some distance down the trachea.

# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

Friday, May 20th, 1921.

*President*—Sir CHARLES BALLANCE, K.C.M.G., M.S.

### Discussion on Dr J. S. Fraser's Paper on the Pathological and Clinical Aspects of Deaf-Mutism. (See Jan.-March Nos.).

The PRESIDENT said the internal ear was the great subject for the future, and the profession was, as yet, only on the brink of knowledge in regard to it.

Mr ARTHUR CHEATLE remarked that the first case was interesting from many points of view. There was the question of islands of hearing, which all recognised as occurring in congenital deaf-mutism. Mr Cheatle asked whether Dr Fraser saw any reason for these islands existing. What was the malformation of the cochlear canal? Certainly the vestibular reaction was delayed, but it was present. Recently, when examining a deaf-mute, he found, on cold syringing, a well-marked vestibular reaction on both sides in thirty seconds. Dr Hurst had shown a case from which he was inclined to think that if there was vestibular reaction the deafness was likely to be a neurosis, but Dr Fraser's case showed that the cochlear canal may be malformed and the vestibular mechanism intact. With regard to the site of malformation, Mr Jenkins had told him (the speaker) that structures which were formed late in the evolutionary era were more liable to malformation than were those formed at an earlier epoch, and the case of Dr Fraser bore that out.

Dr ALBERT A. GRAY agreed with the exhibitor that the first case seemed to be one of mal-development; there seemed no sign of inflammatory activity. His belief was strengthened by the development of the stria vascularis. In 1919, in the *Journal of Laryngology*, he described two cases in which there was a peculiar development of the stria vascularis; it was hanging down as a pedunculated structure, reaching almost to the organ of Corti. It was covered with cubical epithelium. In Dr Fraser's case it was adherent to the tectorial membrane. The tegmentum vasculosum in the bird and the reptile was similar to the stria vascularis as it was seen in this case. In the second case, of acquired deaf-mutism, there was no sign of this peculiar development of the stria vascularis.

A feature Dr Fraser did not refer to—but he was sure the sections were thin enough to show it—was the condition of the tensor tympani muscle. One would have expected that muscle to have undergone some degeneration or malformation in deaf-mutism; but in the three cases he had himself examined, the muscle was as well developed as in the normal person. He

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expected to find it very ill developed, owing to the lack of stimulus of sound. He did not examine the stapedius. Most deaf-mutes heard some sound, if it were loud enough, and it might be that this occasional stimulus sufficed to keep the tensor tympani a healthily active muscle.

Another important matter—which he did not think could be determined by microscopical examination—was in regard to the size of the labyrinth. In deaf-mutes one would expect to find the labyrinth smaller than normal, *i.e.*, about the size of that of a child at or before birth. He prepared his sections with paraffin and celloidin before decalcification so as to guard against contraction of the specimen, and found that the labyrinths of deaf-mutes were distinctly larger than normal.

Dr DAN M'KENZIE said that it was of great interest to note the proportion of cases in which deaf-mutism was acquired. In making a classification it was important to keep certain points in mind, distinguishing cases due to intra-uterine disease from those caused by hereditary defect. It was still a question as to exactly what that defect consisted of. Of the acquired cases in Dr Fraser's series, he noted that one followed fracture of the cranial base. He could recall a similar case, though when such a cause was attributed by the patient's friends one was inclined to think it was a case of *post hoc ergo propter hoc*; still, in one's zeal for knowledge there might be danger of missing the truth.

With regard to meningitis, at Dr Fraser's last demonstration before the Section, he showed a series of slides illustrating cerebro-spinal meningitis and its effects on the labyrinth. There was some discussion as to whether the pus in the middle ear was due to the meningeal and labyrinthine infection passing out, or to an accidental infection of the middle ear from a septic organism. He (the speaker) had been wondering whether the meningeal infection could take place from without inwards, *i.e.*, whether it was possible that the route of infection of the middle ear by the meningococcus might be from the naso-pharynx, in which that organism is said to reside. He believed it was the rule that the deafness in cerebro-spinal meningitis came on very early in the disease. That was rather a striking point in this connection.

Mr SYDNEY SCOTT drew attention to the congenital case, in which the scala media was distended in one cochlea and stenosed in the opposite cochlea. These differences should throw some light on discussions concerning the origin of the endolymph and perilymph. Some might regard the appearances seen to be artefacts, but Dr Fraser's specimens showed conclusively that the abnormalities were pathological.

Dr J. S. FRASER (in reply). In regard to the congenital deaf-mute patients being capable of some hearing, he took it that Corti's organ was so badly formed that the child could not hear normally, but might still be able to appreciate a loud sound close to the ear. This was analogous to a very defective eye being able to appreciate light or even to count fingers at a short distance. He agreed with Mr Cheate as to the nature of the case recently published by Hurst; he (the speaker) thought it was probably a case of congenital deaf-mutism with certain remains of hearing; he did not think it was one of hysterical deafness.

Dr Gray had spoken of the mal-development of the cochlea. He (the

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speaker) did not know whether members would recall the compressed pith flowers which used to be put into finger-bowls. When dropped in, these flowers were very tiny, but they gradually expanded to something resembling a rose or a pansy. That, it seemed to him, was a useful analogy to understand the development of the otic vesicle. Some of the pith balls expanded perfectly, and gave a good representation of a flower, others did not. A part remained unexpanded or became over-expanded. In the case of the ear, that part of the otic vesicle which formed the utricle and canals, expanded all right, but that part which should form the saccule and the cochlea did not develop properly. In this way the stria vascularis, the spiral crest, Corti's organ, and the other structures which were developments of the original uniform epithelium lining the otic vesicle never became properly formed. He agreed with Dr Kerr Love in regarding congenital or developmental deafness as a malformation handed down from one generation to another on Mendelian lines—the deafness being recessive like dwarfism in sweet peas. He did not believe that congenital malformation of the cochlear canal and saccule was the result of intra-uterine meningitis.

As far as he could make out, in the congenital case the tensor tympani was well developed, and the labyrinth seemed to be of about the normal dimensions.

What no member had mentioned was the part the brain might play in regard to this question. French observers—Castex especially—contended that deaf-mutism was not so much a question of mal-development of the inner ear as of the hearing centres in the brain. In the congenital deaf-mute case the brain was being examined by Dr James Dawson, but it was a long process. He would report the result later.

In answer to Dr M'Kenzie, German observers found a larger proportion of acquired cases than he (the speaker) had found. In Switzerland, however, where there were so many cases of endemic cretinism and deaf-mutism, some 75 per cent. of the cases of deaf-mutism were "congenital." He did not agree with Dr M'Kenzie as to the route of infection in cerebro-spinal meningitis. He would like Dr M'Kenzie to see his specimens again. The Eustachian tube and tympanic membrane were healthy; all that was wrong was a congestion of the mucosa and a little exudation in the region of the round and oval windows, where the middle ear came into close relation with the labyrinth, which contained purulent exudate. The middle ear was not filled with pus which was invading the labyrinth. It was a commencing spread of inflammation from the inner to the middle ears.

In regard to the distension of the ductus cochleæ on the right side and its collapse on the left, there was here a possible fallacy. The patient had meningitis, and he (the speaker) opened the dura of the posterior fossa on the right side, but not on the other. It was possible that, on the side on which tension in the subarachnoid space had been relieved, the cochlear duct had expanded. He thought, however, that from an early period of development there had existed a collapse of the cochlear duct on the left side (unoperated ear), and an abnormal dilatation on the right side. A similar condition had been observed by other workers.

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## SECTION OF LARYNGOLOGY

December 2nd, 1921.

*President*—Sir WILLIAM MILLIGAN.

**Epidiascopic Demonstration illustrating Repair of Nasal Deformity caused by Syphilis**—Dr DOUGLAS GUTHRIE.—Female, aged 18, with inherited syphilis which had destroyed the cartilaginous septum and columna and had caused an extreme degree of saddle-nose deformity. Anti-syphilitic treatment was carried out for three months. The nasal bridge was then reconstructed with costal cartilage graft and a columna made from an upper flap from the skin of the vestibule and two lower flaps from the upper lip. Dr Guthrie had operated on seven cases of nasal deformity with good results.

THE PRESIDENT said he used a graft from the fibula and included the perichondrium.

Mr WOODMAN emphasised Dr Guthrie's point as to the necessity of carrying the submucous incision as far as the tip of the nose.

Mr J. F. O'MALLEY, in cases in which deformity was not so great, had grafted from the opposite direction, making the incision into the tip of the nose immediately below the most prominent point.

Mr F. H. DIGGLE had experience of only one case, which appeared satisfactory at first, but three months later, the graft had slipped.

Dr KELSON and Mr A. A. SMALLEY commented upon the good results at first, and the tendency to shrinkage later: the latter had found that a horse-hair strand passed through the nose and tied over the graft gave good anchorage.

Major GILLIES and Mr T. P. KILNER emphasised the necessity of skin grafting the inner aspect of the nose before inserting the cartilage graft. It was necessary to replace the destroyed mucous membrane as well as the lost bone or cartilage, otherwise the graft did not hold satisfactorily.

Dr GUTHRIE (in reply) said his case had preserved the original good improvement obtained at the operation in June. He had not required to anchor the graft. The pocket to contain the graft must be accurately made so that the latter was tightly gripped. The advantage of cartilage over paraffin or other foreign bodies lay in the fact that it was natural tissue and that it could be trimmed to the exact size and shape required.

**Intrinsic Epithelioma of Larynx**—Sir ST CLAIR THOMSON.—Schoolmaster, aged 53, with progressive hoarseness for one and a half years. The left vocal cord, with the exception of a trifling area posteriorly, was replaced by an infiltrating, knobby, irregular neoplasm, which had a characteristic rough, white, slightly cauliflower appearance. In the anterior third, there was a greyish, retracted area, doubtless similar to the nipple retraction in mammary carcinoma. The left vocal cord moved freely, with slight mechanical impairment anteriorly. The diagnosis was based entirely on the clinical appearances.

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Drs JOBSON HORNE, SEWELL, and SMURTHWAITE questioned the statement that the cord moved freely: Dr Jobson Horne considered that there was a myopathic impairment of movement. Sir St Clair Thomson accepted the criticism regarding the mobility of the vocal cord.

(*Postscript*.—The tumour was removed the following day by laryngofissure, and microscopically a squamous epithelioma was found reaching down to the small muscles: removal was complete.)

**Sarcoma of Cheek and Superior Maxilla with Diffuse Secondary Growths**—Mr E. D. D. DAVIS.—Male, aged 39, seen September, 1920, with soft tumour of two months' duration involving the right incisor fossa, and another occupying the alveolus in the position of the right upper wisdom tooth. Examination showed that the antrum was involved. The right maxilla was excised. Secondary growths, without local recurrence, developed and involved the cervical glands on both sides, the left brachial plexus, left ribs and penis. The microscope demonstrated their sarcomatous character. Treatment by radium had caused disappearance of the growths.

**Tuberculoma of the Left Malar Recess and Floor of Orbit**—Mr E. D. D. DAVIS.—Woman, aged 39, complained of swelling below the outer corner of the left eye of nine months' duration. The eyeball was displaced upwards and forwards: there was no pain or glandular involvement. Exposure of the swelling revealed a soft, vascular, carcinomatous-like growth, occupying the floor and outer angle of the orbit and eroding the malar bone. Sections demonstrated chronic inflammatory tissue with giant cells and was labelled "Tuberculosis."

**Piece of Wire removed from Right Arytenoid Cartilage by the Indirect Method**—Dr ANDREW WYLIE.—Female, aged 57, while eating beans, "swallowed a needle." When examined two days later, a small dark object was seen protruding from the right arytenoid towards its inner surface. A wire, 1 inch long, was removed with Mackenzie's forceps.

**Case of ? Arrest of Development of the Trachea**—Mr C. A. SCOTT RIDOUT.—Boy, aged 16, seen September 1921, with extreme dyspnoea and general enlargement of the thyroid gland, especially of the right lobe. Difficult breathing on exertion was first noticed after typhoid fever eleven years before: he developed at that time a "lame right hip." Voice remained unaffected. He had pneumonia twelve months ago with aggravation of respiratory distress. Thyroid swelling noticed two weeks before admission.

Low tracheotomy was difficult; the trachea, cord-like and collapsed, was flattened laterally and pushed to left. Later, a fresh incision was made over the cricoid cartilage, which was normal in size, though the

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trachea up to this point was atrophied. Larynx, except for somewhat infantile epiglottis, was not unduly small. The thyroid gland became normal under thyroid treatment.

THE PRESIDENT did not think that typhoid could cause such uniform stenosis and suggested that the whole bronchial tree might be found in a similar condition: the symptoms were aggravated by the typhoid. Cases of congenital malformation of the trachea and bronchial tree were recorded.

Dr WILLIAM HILL remarked that the normal state of the cricoid was not consistent with the condition being congenital. The vestibule of the larynx was not infantile. The lumen of the trachea was of normal shape, unlike that of a compressed trachea. The growth of the trachea appeared to have stopped when the typhoid occurred.

Sir J. DUNDAS-GRANT said the history did not favour a congenital origin: some atrophy of cartilage may have resulted from the typhoid and caused apparent persistence even after removal of the thyroid gland pressure.

Mr J. F. O'MALLEY thought that while the thyroid enlargement caused the recent dyspnoea, the typhoid had some connection with the arrest in development. The size of the trachea was that of a child of 5 years.

Dr P. WATSON-WILLIAMS attributed the condition to typhoid. It was possible that ulceration had involved the trachea in subsequent cicatrization.

Dr JOBSON HORNE considered that with such an obvious cause as pressure from an enlarged thyroid gland, it was unnecessary to attribute the condition to typhoid.

Dr DONELAN enquired whether the atrophy of the thigh muscles also dated from the typhoid fever.

Mr RIDOUT (in reply) said that the atrophy of the thigh muscles followed the typhoid. The condition of the tracheal cartilage produced the impression of a collapsed rubber tube. He believed the whole trachea was in a similar condition and he would examine the bronchial tree by bronchoscopy. The head and neck of the right femur were smaller than on the left side.

**Case of Laryngeal Web**—Dr W. H. KELSON.—Male, aged 56, had operation of laryngo-fissure in July 1921, for carcinoma of the left vocal cord, involving the anterior commissure. The web which had formed prevented adduction of the cord and had recurred after removal.

THE PRESIDENT suggested the use of an apparatus which he had devised for keeping the raw surfaces from reuniting after division.



## ABSTRACTS

### EAR.

*On Pseudo-Fistula.* C. O. NYLEN and J. KARLEFORS.  
(*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 and 2.)

The authors have observed certain nystagmus phenomena in performing the fistula test on a number of patients who had no fistula. The test was performed in the ordinary way by means of a rubber bag with tube and nozzle, the pressure being controlled by a manometer.

(1) Compression is followed, after a latent period of from two to several seconds, by horizontal-rotatory nystagmus towards the compressed side; aspiration, by nystagmus towards the opposite side. There is distinct vertigo. (2) If the experiment is immediately repeated, the response is either absent or very feeble. (3) After an interval of one to several minutes the test is again positive as at first. (4) If aspiration precedes compression, no nystagmus follows. (5) The test becomes negative after a perforation of the tympanic membrane has healed. (6) Nystagmus is elicited in "non-fistula" cases only when the pressure reaches at least 50 to 60 mm. of mercury; more often 100 to 120 mm. or more is required. (7) With a constant pressure the nystagmus gradually increases in strength, and then diminishes and ceases after ten to twenty seconds' duration. It may then be followed by a nystagmus towards the opposite side, lasting from a few seconds to as much as forty-five. If the constant pressure is interrupted when the nystagmus towards the compressed side has ceased, there may also be a spontaneous reversing of the nystagmus towards the opposite side.

Of fifty cases with normal hearing only one gave a positive result. This was a woman of twenty-four with a normal ear on one side and chronic suppurative otitis media on the other. The test was positive on both sides. Of more than one hundred cases with suppurative otitis media, either chronic, acute, or residual, the pseudo-fistula test was positive in forty chronic, seven acute, and seven residual.

The writers consider that the genesis of this nystagmus phenomenon must be due to an impression on the yielding portions of the labyrinth which would cause a movement of the endolymph with accompanying irritation. They have more difficulty in explaining the reversal of the nystagmus during continued pressure, and also the fact that a second test is negative if it follows too soon after the first. They propound two theories, a "central" and a "peripheral," to explain these points, but are not quite satisfied that either of them does so completely.

THOMAS GUTHRIE.

# Abstracts

## NOSE AND ACCESSORY SINUSES.

*Further Investigations into Serious Complications arising from Puncture of the Maxillary Antrum. Experimental Researches on the Effects of the Introduction of Air into the Venous System.* R. GORDING. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 and 2. Stockholm, 1921.)

The author has made a series of experiments with injection of air into the venous circulation in animals (rabbits), and has arrived at the conclusion that the dangerous antrum-phenomena as a rule may be explained on the basis of an air embolus. He assumes that the air bubbles, after having passed either through the pulmonary circulation or through an open foramen ovale, may have passed into the general circulation and there have carried out their effect as arterial air-emboli.

AUTHOR'S ABSTRACT.

*Three Cases of Choanal Atresia.* Dr. JACQUES, Nancy. (*L'Oto-Rhino-Laryngologie Internationale*, July 1921.)

The writer describes these cases in detail, with operative technique, results, and summary. The patients were males, aged 19, 11, and 18 respectively. The condition of atresia was recognised, in the first two, by posterior rhinoscopy only, in the third, the obstructing partition was seen from the anterior nares. In the first two, the blockage was unilateral and complete, in the third it was complete on one side and incomplete on the other. The complete atresia was on the right side in all cases.

Operation, in the first instance, involved submucous resection of the septum, then the piercing of the obstructing curtain with a knife and enlarging the opening made with a punching forceps until the normal borders of the choana were reached. The operation was carried out through the anterior nares, the tip of the biting instrument being guided by a finger in the naso-pharynx. The nares was packed by a vaselined wick of gauze plugged into the posterior choana, and kept there, with occasional renewals, for about three weeks. The writer states that no ear or other complication arose from this procedure. After the final removal of the packing, the opening was maintained by daily passage of a urethral bougie of large calibre. When last seen by the operator, the patients were carrying out for themselves daily passage of the bougies, and were engaging in breathing exercises. He mentions that from time to time trouble arose from the exuberant growth of granulations round the edges of the wound.

Regarding the pathology of the condition, it was found that the partition was part-membrane, part-osseous. In two cases the point of least resistance was the vomero-palatine angle, while in the third, the spheno-palatine angle was weakest. The bone of the curtain was

## Nose and Accessory Sinuses

continuous with the bone of the body of the sphenoid, the fibrous portion with the periosteum.

Etiologically the cases were somewhat inconclusive. The first patient was of the strumous type, the second was of the neurotic diathesis, the third was a case of congenital syphilis. The conclusion arrived at was that congenital choanal atresia was of the same category as cleft palate and hare lip, a distant sequela perhaps of syphilis in the progenitors, a dystrophy rather than a cicatricial condition.

GAVIN YOUNG.

*Syphilis of the Accessory Cavities of the Nose.* VIGGO SCHMIDT. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 and 2.)

The author, in 1918, met with two cases of syphilitic ethmoiditis in one of which there was also a syphilitic empyema of the maxillary antrum. Both had been regarded as ordinary cases of accessory sinus disease, but both presented a positive Wassermann reaction and were cured by anti-syphilitic treatment. After this the author had the Wassermann reaction carried out in all cases of sinus disease and observed five other similar cases which gave a positive reaction and cleared up under "specific" treatment, and, in addition, out of ten typical cases of nasal syphilis, six in which there was a co-existing sinus infection.

The syphilitic nature of a sinusitis is neither disproved by a negative nor proved by a positive Wassermann reaction, which forms a guide only. A sinusitis can only be regarded as certainly of syphilitic origin when "specific" treatment is followed by disappearance of all symptoms objective and subjective and of the opacity on transillumination and radioscopy.

In conclusion the author suggests that a systematic use of the Wassermann reaction will disclose in a fair percentage of cases of accessory sinus disease a syphilitic infection before the latter has assumed the characteristic appearances of syphilitic necrosis.

THOMAS GUTHRIE.

*The Sphenoidal Sinus and the Temporal Lobe.* J. PARSONS SCHAEFFER, M.D., Ph.D., Professor of Anatomy, Jefferson Medical College, Philadelphia, Penn. (*Journ. Amer. Med. Assoc.*, Vol. 76, No. 22, 28th May 1921.)

This paper deals with the anatomy of the sphenoidal sinus, particularly with the varying anatomical relationships which occur when the pneumatization of the sphenoidal bone extends into the neighbouring bones, the pterygoid processes, greater and lesser wings, the rostrum, and the anterior and posterior clinoid process. Extension into the occipital, palate, ethmoid, and maxilla are not uncommon.

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Special reference is made to the extension of the sinus sufficiently far into the great wing of the sphenoid beneath and lateral to the dural cavernous sinus so as to come into relationship with the temporal lobe of the brain. One cannot ignore the sphenoidal sinus as a possible factor in the temporal lobe abscess.

PERRY GOLDSMITH.

*Studies in the Lymph Drainage of the Accessory Nasal Sinuses.*  
DRS MULLIN and RYDER. (*Laryngoscope*, Vol. xxxi., No. 3, p. 158.)

The authors point out that very little work has been done on this subject, and that most of it has been done after death, by injections under pressure. The series of experiments recorded was carried out on living animals. The frontal sinus of cats and the maxillary antrum of rabbits were chosen. The injection used was India ink, a suspension of finely divided carbon about the same size as cocci, and also insoluble. Inoculations of tubercle bacilli were made in the same way. The results go to show that the already accepted routes of absorption are correct. In the frontal sinus there was difficulty in keeping the ink sufficiently long without damming the frontonasal duct. The results demonstrate for lymphatic function the continuity of the nasal mucous membrane into all the cavities. From the posterior wall of the frontal sinus a communication with the dura was demonstrated. Injections made into the nasal passages were not absorbed by the lymphatics of the nose, but the lungs and bronchial routes were severely pigmented. The tonsil does not appear to receive drainage from any area beyond its own surface.

ANDREW CAMPELL.

*The Use of Scarlet Red Emulsion in Atrophic Rhinitis (Ozena).* (A preliminary Report.) Dr J. C. SCAL. (*Laryngoscope*, Vol. xxxi., No. 8, p. 628.)

An emulsion of scarlet red (biebrich azo-benzine) 4 per cent. with quince seed as its base is used. It is found to adhere closely to the mucous membranes in spite of the secretion. This treatment has produced relief from symptoms; whether this will remain permanent it is too early to say. The report is made to stimulate others to try the method.

ANDREW CAMPELL.

### LARYNX.

*High Tracheotomy.* CHEVALIER JACKSON. (*Surgery, Gynecology, and Obstetrics*, May 1921.)

The author holds that of all operations tracheotomy is the worst done and inveighs against the current teaching of the technique of the operation.

He advocates a rapid two-step finger-guided low tracheotomy, splitting the front of the neck from the thyroid to the supra-sternal

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notch. The author is against any form of general anæsthetic, and holds that it needlessly endangers the patient's life.

High tracheotomy is the chief cause of laryngeal stenosis. In the after treatment of tracheotomy, the wound should be kept open and allowed to granulate from the bottom in order to allow the cartilaginous rings to unite.

MUSGRAVE WOODMAN.

*The Nerves of the Human Larynx.* T. F. M. DILWORTH.

(*Journal of Anatomy*, Vol. lvi., p. 48.)

The investigator notes that English-speaking anatomists follow the classical description restricting the internal laryngeal nerve to a purely sensory function, and quotes Exner followed by continental anatomists as teaching that each laryngeal muscle has a double nerve supply from the superior and inferior laryngeal nerves.

His own description is based on a dissection of thirty-three larynges, and (omitting the relations he describes), his findings may be summarised thus:—

## I. External laryngeal nerve.

### (a) Constant branches, to

1. Crico-thyroid muscle.
2. Inferior constrictor muscle.

### (b) Inconstant branches

1. Join inferior laryngeal nerve.
2. Apex of lateral lobe of thyroid.
3. Join internal laryngeal nerve.

## II. Internal laryngeal nerve—two main divisions.

### (a) Larger horizontal branch; sheaf of four main twigs, to

1. Mucous membrane of lateral wall of the pharynx lateral to the glosso-epiglottic field.
2. Mucous membrane of vallecule.
3. Anterior surface of epiglottis and mucous membrane of the vestibule.
4. Anterior surface of epiglottis near attachment of thyro-arytenoid muscle and mucous membrane of false cord and region above it.

### (b) Smaller, descending branch, to

1. Muscles in the aryteno-epiglottic fold.
2. Mucous membrane.
3. Mucous glands on the posterior surface of the arytenoid cartilage.
4. (Sometimes two branches), inter-arytenoideus muscle, a constant branch with definite twigs to the muscle and to the mucous membrane on its posterior aspect, but *none* to crico-arytenoideus muscle.
5. A terminal branch piercing inferior constrictor to become continuous with inferior laryngeal nerve.

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## III. Inferior laryngeal nerve.

One inch before entering larynx it divides into two divisions.

(a) Branches before or at division, to

1. Trachea in course upward.
2. Œsophagus in course upward.
3. Thyroid gland where attached to trachea.
4. Œsophagus just below its angle of junction to pharynx.

(b) Smaller division enters with internal laryngeal = II. *b* 5 above.

(c) Larger or muscular division, to

1. Crico-arytenoideus posticus.
2. Inter-arytenoideus.
3. Crico-arytenoideus lateralis.
4. Thyro-arytenoideus.

[*Note*.—The figures in the above table are those of the abstractor.]

Hence the inter-arytenoideus muscle is supplied from both superior and inferior laryngeal nerves by twigs which may communicate one with another but do not cross the middle line; the other muscles by the inferior laryngeal nerve only.

The author suggests this is a highly modified plexus arising from a strand separated from the vagus and represented by the continuous nerve joining the internal and recurrent laryngeal. T. B. LAYTON.

*Heliotherapy for Tuberculosis of the Larynx.* Dr KOWLER, Mentone.  
(*Bulletin d'Oto Rhino Laryngologie*, Paris, July 1921.)

The author describes his apparatus for holding a nickel laryngoscopic mirror in place. Briefly the mirror, and if desired a tongue depressor, are fixed to a modified gag: the patient is then placed in position facing the sun, with the face protected. Dr Kowler claims the following advantages:—

- (1) The surgeon need not be constantly present.
- (2) The patient is not fatigued by holding the mirror.
- (3) Accuracy, and the presence of ultra-violet rays in the reflected light greatly shorten exposure.
- (4) The apparatus is light, easy to apply and to adjust.

He claims that very remarkable results can be obtained by exposing the larynx to sunlight.

E. WATSON-WILLIAMS.

*On a Fulminating Variety of Diphtheric Croup in Typhoid Fever: Malignant Diphtheric Œdema of the Larynx.* MAURICE JACOD.  
(*Acta Oto-Laryngologica*, Vol. ii., fasc. 4.)

During the epidemic of enteric which attacked the French armies at the end of 1914, the sudden forced evacuation of certain hospitals resulted in the association of 120 cases of typhoid with some cases of

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diphtheria. In spite of all possible precautions, of the 120 cases of typhoid 13 developed diphtheria, in 7 naso-pharyngeal, and in 6 laryngeal. In 4 of the 6 laryngeal cases, the disease was both clinically and anatomically quite unusual, being characterised by the surprisingly rapid onset of an enormous œdema of the larynx with hæmorrhagic effusion into the tissues, and a complete absence of false membrane or any kind of exudation. The local condition was moreover, accompanied by signs of a massive intoxication, so that tracheotomy, although it relieved the urgent dyspnoea, was followed by no general amelioration, and death occurred in less than twenty-four hours from the onset of the throat symptoms.

The diagnosis presented considerable difficulty, depending, in the absence of any trace of false membrane, entirely on bacteriological examination. The disease differed altogether from true laryngo-typhoid which is characterised by perichondritis and cartilage necrosis.

THOMAS GUTHRIE.

*Laryngeal Diphtheria.* JOHN F. HOGAN, M.D., Baltimore. (*Journ. Amer. Med. Assoc.*, Vol. lxxvii., No. 9, 27th August 1921.)

For the year 1919 and 1920 there were 246 deaths in the city of Baltimore due to diphtheria of various types, 82.11 per cent. were laryngeal.

From an analysis of these cases Hogan says, it appears quite evident that there is a tendency *not* to diagnose laryngeal diphtheria in time, and, when diagnosed, too great a delay is permitted before intubation is carried out. It is a great advantage to have intubated patients in a hospital when trained assistance is always at hand in case the tube should come out. In the fatal cases with laryngeal diphtheria only 101 or 50 per cent. were intubated. Five patients died while intubation was being attempted, 1 case received intubation, 3 were reintubated, 1 five times. In only 170, or 83.74 per cent., of these 202 fatal cases of laryngeal diphtheria was antitoxin given. In the writer's experience the death-rate from laryngeal diphtheria in intubated cases has ranged from 30 to 35 per cent.

Emphasis is laid upon the somewhat prevailing belief that diphtheria of the larynx cannot exist without coincident manifestations of the disease in the pharynx, nose, or naso-pharynx.

Great as is the admitted value of the serum treatment, it must be remembered that once laryngeal œdema develops to such an extent as to cause marked dyspnoea, antitoxin will not act quickly enough in this type of patient to overcome the necessity for intubation. From a study of the cases in Baltimore, the writer is convinced that the hope of a decreased reduction in the death-rate lies in earlier recognition and timely treatment with antitoxin and intubation.

PERRY GOLDSMITH.

## LETTERS TO THE EDITORS

TO THE EDITORS,

*The Journal of Laryngology.*

SIRS,—Is it wiser to open and to drain the mastoid antrum in the early days of middle-ear suppuration, after the membrane has been opened, or to be content with simple meatal treatment? I am assuming, of course, that such signs and symptoms as continued pyrexia, unrelieved pain, mastoid œdema, and the like, are absent, since in these circumstances no divergence of opinion would be likely to arise.

It is not difficult to see that at the present moment otologists are divided into two schools: the older and more conservative operators who do not open the antrum unless there is some urgent call for the operation, and the younger and more radical who sympathise with the teaching of C. J. Heath on this point.

It is a well-founded reproach of surgery, as of medicine, that its votaries are the victims of fashion, and that not to be up-to-date or modern, whether that quality be good or bad, is to write oneself down as a back number.

This reproach we ought to do our best not to deserve, and that is the reason why I am now raising the subject for discussion, and, if possible, for settlement.

With regard to my own practice, if that is of any value to anyone but the writer (and his patients *bien entendu!*), I confess that as the years go on and my acquaintance grows, on the one hand with the grievous accidents attendant upon the “acute ear,” and, on the other hand, with the very moderate success of the radical mastoid, my feeling is becoming more and more akin to that of the younger and bolder school, until I find that I am advocating and practising antrum drainage unless paracentesis and meatal antiseptics quite promptly lead to a drying-up of the discharge.

This attitude, as we all know, is what C. J. Heath has been advocating for many years, with a force and eloquence which I fear I must term intemperate, and which, I am sure, has retarded rather than advanced the cause he has at heart. In this view, however, I have come to agree with Heath, but I disagree totally with him in regard to the operation to be adopted.

After all, what are the objections to the simple opening and drainage of the mastoid antrum in the first days or weeks of suppuration of the middle ear? In skilled hands, the operation is a simple one, and its risks are certainly no greater than is the removal of the vermiform appendix *à froid*. On the score of operation-mortality, therefore, there need be no hesitation in operating early.



## Letters to the Editors

The real criticism, however, which early interference must face is this: Is the simple operation likely to cure a suppurating middle ear *more quickly* than meatal treatment? The kernel of the question lies in the words I have italicised. Time is the essence of the contract, as otologists surely would elect to adopt whichever method reduced the duration of the disease, even if it were only by one day.

Having propounded this question, I do not propose to answer it, as I should like to hear the experiences and opinions of my colleagues on the matter.

Another question is certain to be asked. It may be expressed in this way: Will early mastoid antrum drainage cure the middle-ear disease? The answer is that in a majority of cases it will, in a minority it will not.

The same question may be raised<sup>1</sup> and the same answer can be given in discussing simple meatal treatment.

The crux lies here: Is the minority of uncured cases likely to be greater in number with drainage of the antrum, or with simple meatal treatment? Upon the reply to that question our practice will largely depend.

But there remains yet another aspect of the subject, which also we may set forth in the suggestive Socratic method I am adopting.

In addition to weighing the respective merits of the two methods of treatment as regards their effect upon the cure of the aural suppuration, we have still to consider this point: are complications more likely to occur if the antrum is drained at an early date or if the treatment is limited to the meatus? Or, I may alter the question to this form: when a complication occurs in the course of an acute suppuration of the middle ear under our care from the start, does not the otologist in charge of it sometimes feel that if he had drained the antrum earlier the complication in all probability would not have arisen?

The answers to these questions I leave to your readers. — I am, etc.,

DAN M'KENZIE.

TO THE EDITORS,

*The Journal of Laryngology.*

SIRS,—I am anxious to get an authoritative opinion upon “The Blood-Clot Method of Closing the Mastoid after the Simple Operation.”

I am in the habit of opening the mastoid antrum if the discharge, *being free*, remains copious and persistent for three weeks, after careful local treatment has been carried out.

My object in so doing is to protect the delicate structures of the middle ear and secure complete repair of the membrane. Some

## General Notes

surgeons put the time limit down to ten days, and I am inclined to agree, provided careful local treatment has been used beforehand.

My cases sometimes take three to six months to heal, but the membrane, as a rule, becomes whole in a short time. Politzerisation during the later stages prevents contractions in the middle ear, and the resultant hearing is good.

To allow the wound to heal slowly from the aditus to the surface brings about almost complete obliteration of the antrum, and thereby lessens the risk of subsequent ear infection. Only a few cases show after-deformity, *i.e.*, a hollow behind the pinna. In these cases the disease has been more than a suppurative mastoiditis; there has been bone necrosis, peri-sinus abscess, or extra-dural abscess in almost all instances. The early closure seems to me to defeat the purpose we have in view. The proposal to insert a cigarette drain from the aditus to the skin, to allow the cavity to fill with blood, and to suture the wound, appears to me to be open to very grave objections. If a drain be needed, the infected material must, after twenty-four hours, when the bactericidal power of the blood has disappeared, affect the clot and disintegrate it. Where success has been achieved, it seems to me to be due to luck or to the fact that the operation was not necessary.—

Yours, etc.,

J. A. MACGIBBON, M.D., F.R.C.S. Edin.

CHRISTCHURCH, N.Z.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W. 1.

*Section of Laryngology*—*President*, Sir William Milligan, M.D. *Hon. Secretaries*, Walter G. Howarth, F.R.C.S., and T. B. Layton, D.S.O., M.S. The next Meeting of the Section will be held on Friday, 3rd March, at 4.45 o'clock. Members intending to show patients or specimens should intimate the same to the Senior Hon. Secretary, Walter G. Howarth, 21 Devonshire Place, London, W. 1.

A discussion will be held on "The Treatment of Malignant Growths of the Nasal Accessory Sinuses." Mr E. Musgrave Woodman and Dr Reginald Morton will open the discussion.

*Section of Otology*—*President*, A. Logan Turner, M.D. *Hon. Secretaries*, Norman Patterson, F.R.C.S., and F. J. Cleminson, M.Ch. The next Meeting of the Section will be held on Friday, 17th March, at 5 o'clock. Members proposing to show patients or specimens, etc., should send notice along with a short written description of the same to the Senior Hon. Secretary, Norman Patterson, F.R.C.S., 16 Devonshire Place, London, W. 1, at least twelve days before the Meeting.

The Meeting of the Section in April will be held at Leicester on Saturday, the 29th of that month.

# General Notes

## BRITISH MEDICAL ASSOCIATION, GLASGOW.

The Ninetieth Annual Meeting of the British Medical Association will be held under the Presidency of Sir William Macewen, F.R.S., from the 25th to the 29th July inclusive. The Sectional Meetings are arranged for the 26th, 27th, and 28th. Laryngology and Otology have been placed in the Single Day Sections.

Dr John M'Intyre (Glasgow) is President of the Section of Laryngology, and Dr A. A. Gray (Glasgow) is President of the Section of Otology.

\* \* \*

## TENTH INTERNATIONAL OTOLOGICAL CONGRESS, PARIS, 19th to 22nd July 1922.

The following subjects for discussion (*Rapports*) have been arranged :—

- I. Abscess of the Cerebellum.
- II. Otitic Meningitis.
- III. The Value of Functional Tests of the Vestibular Apparatus.
- IV. Syphilis of the Ear.

The speakers will be :—MM. Buys, Gradenigo, Hennebert, Hinojar, Jenkins, Quix, and Schmiegelow.

During the Congress, a Supplementary Meeting will be devoted to the discussion of the following subject :—

### The Treatment of Cancer of the Larynx by Operation and by X-rays and Radium.

The speakers will be :—MM. Chevalier-Jackson, Moure, Regaud, St Clair-Thomson, Sebileau, and Tapia.

The subjects for discussion will be printed and distributed before the Congress meets.

The mornings will be occupied in visiting the Departments for the treatment of Diseases of the Ear, Throat, and Nose, and for the surgery of the Head and Neck. (Operations, presentation of patients, etc.)

A collection of instruments and of anatomical and surgical specimens relating to diseases of the ear, nasal fossæ, and nasopharynx will be shown at the Faculty of Medicine during the Congress.

The Committee of Organisation are desirous of obtaining the enrolment of members of Congress, not later than 1st April. Notification must be made to Dr A. Hautant, Secrétaire Général, 28 rue Marbeuf, Paris (VIII).

Further, they desire to receive the titles of papers and communications from members of Congress as soon as possible after their enrolment.

It is necessary to send, before 1st April, a short résumé of the papers to be read at the Congress.

The subscription, which entitles members both to a copy of the *Rapports* and to the résumé of papers, is £2 sterling, and should be paid to the Treasurer, Dr George Laurens, 4 Avenue Hoche, Paris (VIII).

In order to facilitate arrangements, members are requested to state whether they intend to be accompanied by members of their family.

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The American Laryngological Association will meet, under the Presidency of Dr Harmon Smith, in Washington, D.C., on the 1st, 2nd, and 3rd May.

## General Notes

The American Otological Society, under the Presidency of Dr H. S. Birkett, Montreal, will meet in Washington, D.C., on the 2nd and 3rd May. *Hon. Secretary*, Dr Thomas J. Harris, 104 East 40th Street, New York.

A cordial invitation to attend the Meeting has been extended by the American Otological Society to the Section of Otology of the Royal Society of Medicine.

\* \* \*

The Section of Laryngology and Otology of the American Medical Association, under the Presidency of Dr Joseph A. Stucky, will meet at St Louis from the 22nd to the 26th May.

\* \* \*

Through the courtesy of Dr Bryson Delavan of New York, we are able to bring to the notice of our readers the regulations for the de Roaldes Prize of the American Laryngological Association. A gold medal, of the value of 150 dollars, is offered for the best original thesis upon a subject pertaining to Laryngology or Rhinology. It is now open for competition to non-members of the Association. Theses must be in the hands of the Chairman of the Prize Committee prior to 1st April 1922. Chairman, Dr D. Bryson Delavan, 40 East 41st Street, New York, U.S.A.

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### A "CONSULTATION DAY" AT THE CENTRAL LONDON THROAT AND EAR HOSPITAL.

A valuable addition to the clinical attractions at this well-known London special hospital has recently been provided in the general meeting once a month for consultation, to which members of the active surgical staff arrange to bring their interesting and puzzling cases.

An informal discussion, the *perole* starting with the most junior and passing in rotation to the most senior surgeon, follows the examination of the cases, and as the meeting is also open to practitioners and students working at the hospital, the instructive possibilities of the new departure to those who care to avail themselves of the opportunity, are obvious.

To give some little idea of the rich material at their disposal we may mention the following cases, selected from a large number brought before a recent meeting: a case of fixation of both vocal cords in adduction of sudden onset, in which the diagnosis seemed to be some inflammatory lesion rather than the more usual one of bilateral abductor paralysis; one of sarcoma of the tonsil and soft palate of an ineradicable nature in which a single exposure to diathermy had kept the disease in abeyance for a period of two years; another, of an operation undertaken for traumatic cicatricial stenosis of the trachea; and a fourth, of an ulcer of recent origin and doubtful character deep in the hyoid fossa of a young woman.

To the members of the staff themselves the high utility of "consultation day" is already clearly apparent, and they confidently anticipate that the free and candid expressions of opinion which the cases evoke will lead to a wide extension of their own knowledge and usefulness.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## THE STRUCTURAL TYPE OF THE MASTOID PROCESS, BASED UPON THE SKIAGRAPHIC EXAMINATION OF ONE THOUSAND CRANIA OF VARIOUS RACES OF MANKIND.

By A. LOGAN TURNER, M.D., F.R.C.S.E., and the late  
Major W. G. PORTER, D.S.O., F.R.C.S.E.

(Continued from page 121.)

### II. ANTHROPOLOGICAL INVESTIGATION.

(a) **The Types of Mastoid Process in Skulls of Different Cephalic Index.**—The craniological material at our disposal led us to carry our research along lines which were of anthropological rather than of clinical interest. We were in the position to analyse the relative frequency of the occurrence of the two types of mastoid process in the Dolichocephalic, Mesati-cephalic, and Brachycephalic crania; and further, having selected for the general purposes of our research the skulls belonging to a number of different races, we had the opportunity of inquiring into the mastoid types both in the mixed and in the relatively pure races.

The cephalic index, a measurement based upon the relative length and breadth of the skull, is a craniological classification which embraces the three great skull types into which mankind is grouped. Although the relation of the length to the breadth of the cranium constitutes one of the main racial head characters and furnishes us with the long-heads, the middle-heads, and the short-heads, there are other cranial and facial characters which contribute to the building up of the characteristics of

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individual races. It is unnecessary, however, to refer to these in connection with the present subject.

The Dolichocephali and the Brachycephali form the two extremes of the cranium in the human series, and so distinct may each type of skull be that when the races are relatively pure, we may say that where the cranium is markedly long-headed, then the short-heads will be uncommon in that race, and where the cranium is pronouncedly short-headed, then the long-heads are rare. Amongst the former may be mentioned the Eskimo, the aboriginal Australian, and the African negro; among the latter, the short-headed American Indian, the Polynesian Sandwich Islander, the Andamanese, and the Mongolian. When the people or races possess crania of intermediate proportions, the type may be due either to the skulls of individual members of the race generally being intermediate in their relative proportions to the extreme forms; or, while some are long-heads, others short-heads, the proportion is so distributed that the mean of the race is Mesaticephalic. The latter type is usually produced by an inter-crossing of the long- and short-headed forms, and it constitutes, as a rule, a mixed or very impure race. It is exemplified in the inhabitants of Great Britain and in the majority of the people of Western Europe. As to whether all the relatively pure races are either Dolichocephalic or Brachycephalic, or whether Mesaticephalic people are invariably due to an inter-crossing of the two extreme types of head, is outside the scope of our subject.

In order to carry out this part of our research, it was necessary, in the first place, to ascertain the cephalic index of each skull that was radiographed. Owing to defects in the cranial vault, as a rule the result of injury, it was impossible to make the measurements in 31 of the skulls in the series, consequently the results are based upon the examination of 969 crania of known cephalic index. Of this total, 448 were Dolichocephalic, 305 Mesaticephalic, and 216 Brachycephalic. Of the 300 European crania in the series, the cephalic index was obtained in 279, of which number 65 were Dolichocephalic, 129 Mesaticephalic, and 85 Brachycephalic.

Tables V. and VI. have been prepared to show the relative frequency of the two mastoid types in the three head forms, both in the whole series of crania examined and in the Europeans. While the pneumatic type predominates in each group of

# Structural Type of the Mastoid Process

skulls, the figures indicate that the percentage relation of the two types is not the same in the three groups. The pneumatic process occurs most frequently amongst the short-heads, in the smallest proportion in the long-heads, while it occupies an intermediate position amongst the middle-heads. This is true as regards the whole series of crania as well as the European group; the proportional difference in the occurrence of the two mastoid types is not large, but it is more noticeable among the European crania than when the whole series is considered.

The number of skulls in which anatomical asymmetry of mastoid type was found has been added to each of the tables.

TABLE V.

*Cellular and Acellular Mastoid Types in 969 Crania of known Cephalic Index.*

Crania.	Cellular Processes.	Acellular Processes.	Skulls with Asymmetrical Processes.
Dolichocephalic . 448	767 85 per cent.	129 14 per cent.	58 12 per cent.
Mesaticephalic . 305	525 86 per cent.	85 13 per cent.	35 11 per cent.
Brachycephalic . 216	389 90 per cent.	43 9 per cent.	24 11 per cent.

TABLE VI.

*Cellular and Acellular Mastoid Types in 279 European Crania of known Cephalic Index.*

European Crania.	Cellular Processes.	Acellular Processes.	Skulls with Asymmetrical Processes.
Dolichocephalic . 65	99 76 per cent.	31 23 per cent.	15 23 per cent.
Mesaticephalic . 129	212 82 per cent.	46 17 per cent.	20 15 per cent.
Brachycephalic . 85	144 84 per cent.	26 15 per cent.	8 9 per cent.

(b) **The Type of Mastoid Process in Different Races of Mankind.**—Up to this point our observations show that there is a higher percentage of pneumatic mastoid processes in the Brachycephalic skulls than in either of the two other head

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forms. It is necessary, however, to study in some detail the mastoid processes in the skulls of the various races which make up the complete series of 1000 crania with the object of determining whether the pneumatic and acellular processes merely preserve the relationship to the form of skull characteristic of the race under consideration, or whether one or other type of process predominates, independent of the form of skull distinctive of the race.

For this purpose, Table VII. has been prepared. In the first column are placed the names of the chief races; in the second the capital letters D., M., and B. indicate the dominant cephalic index characteristic of the race; while in the third column the number of skulls examined is stated. The letters D., M., B. do not imply, however, that all the skulls in the individual groups thus marked are Dolichocephalic, Mesaticephalic, or Brachycephalic, as the case may be. On the contrary, some examples of each form, other than the dominant, may occur in any one group; and further, the cephalic index of a small number of the skulls is unknown, as in this Table we are dealing with the complete series of 1000 crania. In the fourth, fifth, and sixth columns we have placed the number and percentage of the cellular and acellular mastoid types found in the different races, and the number of skulls with asymmetrical types. Again, in columns four and five, certain groups of races have been bracketed together and the total percentages of the mastoid types in the combined groups have been placed on the left-hand side of each of these columns.

The analysis of Table VII. is full of interest. In Group 1, which embraces the European peoples, three subdivisions have been made. Amongst the crania of the United Kingdom, the Scottish skulls, 165 in number, have been given a separate place, partly on account of the size and value of the collection, and partly for the reason that, although the mean of the race, like that of the English and Irish, is Mesaticephalic, a considerable Brachycephalic strain exists in many of the Scottish skulls as an inheritance from their short-headed Bronze Age ancestors. Amongst the English and Irish crania, on the other hand, very few Brachycephalic forms occur, and the proportion of Dolichocephali is considerably larger than in the Scottish sub-group. In the 94 Continental Europeans which complete Group 1 the Brachycephalic strain predominates; not only are the majority of the skulls Brachycephalic, but they



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supply nearly two-thirds of the total Brachycephali in the whole European series.

TABLE VII.

*Cellular and Acellular Mastoid Types in 1000 Crania of Various Races of Mankind.*

Race.	Mean Cephalic Index.	Crania.	Cellular.	Acellular.	Asymmetrical Types.
1. English and Irish . . .	M. + D.	41	$\begin{pmatrix} 61 \\ 74\% \end{pmatrix}$	$\begin{pmatrix} 21 \\ 25\% \end{pmatrix}$	$\begin{pmatrix} 6 \\ 7\% \end{pmatrix}$
Scottish . . . . .	M. + B.	165	$79\% \begin{pmatrix} 253 \\ 79\% \end{pmatrix}$	$20\% \begin{pmatrix} 77 \\ 20\% \end{pmatrix}$	$15\% \begin{pmatrix} 27 \\ 15\% \end{pmatrix}$
Continental Europeans . .	B.	94	$\begin{pmatrix} 162 \\ 85\% \end{pmatrix}$	$\begin{pmatrix} 26 \\ 14\% \end{pmatrix}$	$\begin{pmatrix} 12 \\ 12\% \end{pmatrix}$
2. North-American Indians, Chilians, Peruvians .	B.	64	$95\% \begin{pmatrix} 126 \\ 98\% \end{pmatrix}$	$4\% \begin{pmatrix} 2 \\ 1\% \end{pmatrix}$	$\begin{pmatrix} 3 \\ 3\% \end{pmatrix}$
3. Burmese, Chinese, Siamese	B.	47	$\begin{pmatrix} 86 \\ 91\% \end{pmatrix}$	$\begin{pmatrix} 8 \\ 8\% \end{pmatrix}$	$\begin{pmatrix} 7 \\ 7\% \end{pmatrix}$
4. Malays, Andamanese Philippinos, Borneo	B. D.	38	$\begin{pmatrix} 66 \\ 86\% \end{pmatrix}$	$\begin{pmatrix} 10 \\ 13\% \end{pmatrix}$	$\begin{pmatrix} 2 \\ 2\% \end{pmatrix}$
5. Australians . . . . .	D.	173	$\begin{pmatrix} 281 \\ 81\% \end{pmatrix}$	$\begin{pmatrix} 65 \\ 18\% \end{pmatrix}$	$\begin{pmatrix} 30 \\ 17\% \end{pmatrix}$
6. Eskimos . . . . .	D.	19	$\begin{pmatrix} 37 \\ 97\% \end{pmatrix}$	$\begin{pmatrix} 1 \\ 2\% \end{pmatrix}$	$\begin{pmatrix} 2 \\ 2\% \end{pmatrix}$
7. Oceanic Papuan-Melanesians	D.M.B.	51	$98\% \begin{pmatrix} 100 \\ 98\% \end{pmatrix}$	$1\% \begin{pmatrix} 2 \\ 1\% \end{pmatrix}$	$\begin{pmatrix} 2 \\ 2\% \end{pmatrix}$
8. Oceanic Polynesians . .	D.M.B.	72	$\begin{pmatrix} 143 \\ 99\% \end{pmatrix}$	$\begin{pmatrix} 1 \\ 1\% \end{pmatrix}$	$\begin{pmatrix} 2 \\ 2\% \end{pmatrix}$
9. Egyptians . . . . .	D.M.	24	$\begin{pmatrix} 44 \\ 91\% \end{pmatrix}$	$\begin{pmatrix} 4 \\ 8\% \end{pmatrix}$	$\begin{pmatrix} 1 \\ 1\% \end{pmatrix}$
10. Negroes, Hottentots, Kaffirs, Bushmen	D.M.	86	$84\% \begin{pmatrix} 153 \\ 88\% \end{pmatrix}$	$15\% \begin{pmatrix} 19 \\ 11\% \end{pmatrix}$	$\begin{pmatrix} 10 \\ 10\% \end{pmatrix}$
11. Aboriginal Tribes of India and Ceylon	D.M.	123	$\begin{pmatrix} 201 \\ 81\% \end{pmatrix}$	$\begin{pmatrix} 45 \\ 18\% \end{pmatrix}$	$\begin{pmatrix} 16 \\ 16\% \end{pmatrix}$
12. Tasmanians . . . . .	D.	3	$\begin{pmatrix} 6 \\ 100\% \end{pmatrix}$	$\begin{pmatrix} 0 \\ 0\% \end{pmatrix}$	$\begin{pmatrix} 0 \\ 0\% \end{pmatrix}$
		1000	$\begin{pmatrix} 1719 \\ 85\% \end{pmatrix}$	$\begin{pmatrix} 281 \\ 14\% \end{pmatrix}$	$\begin{pmatrix} 120 \\ 12\% \end{pmatrix}$

Examination of the figures in columns four and five reveals the increasing proportion of the pneumatic mastoid processes, and consequently, the diminishing percentage of the acellular types, as we pass from the group of English and Irish crania, in

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which the Brachycephalic strain is lowest, through the Scottish series—which holds an intermediate position—to the Continental European crania in which the Brachycephalic type of skuli predominates. In the English and Irish crania, we find that the pneumatic processes are present in 74 per cent., the acellular in 25 per cent. of the skulls; whereas, in the Continental Europeans, 85 per cent. of the processes are pneumatic and 14 per cent. acellular, making a difference of 11 per cent. between the highest and the lowest figure.

When we pass from the consideration of the mixed European peoples to the study of some of the relatively pure races, we find in Groups 2 and 3 on Table VII. crania representing essentially Brachycephalic types. The North American Redskin and the natives of Chili and Peru are examples of relatively pure short-headed races. Of the 64 skulls in the group, a small number are Mesaticephalic, but many of them are in the higher range of the series and closely approximate to the Brachycephalic type. As many as 98 per cent. of the mastoid processes in these skulls are pneumatic. In Group 3, representing the Mongolian race, there are 47 skulls belonging to Burmese, Chinese, and Siamese, and amongst them the proportion of pneumatic processes is almost as great as in the skulls of Group 2, the actual figures being, pneumatic 91 per cent., acellular 8 per cent. The proportion of Mesaticephalic skulls is somewhat greater amongst the Mongolians than in the American Indians. A combination of the Brachycephalic Groups 2 and 3 gives a total of 111 crania, in which 95 per cent. of the mastoid processes are pneumatic and 4 per cent. are acellular.

Group 4 contains the Malays and Andamanese, both Brachycephalic people, and the natives of Borneo and the Philippine Islands, who are Dolichocephalic in type. While the grouping is more or less the outcome of geographical distribution, the arrangement has a further advantage in that it places side by side a series of Brachycephalic crania with a high percentage of pneumatic mastoid processes, and a number of Dolichocephali in which the acellular type is well represented. Although the total number of skulls in the group is only 38, the two head forms are almost equally distributed. In the Brachycephali, the pneumatic processes are found in 99 per cent. of the skulls, and amongst the long-headed natives of Borneo and the Philippines, 76 per cent. of the crania have

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pneumatic processes and 23 per cent. the acellular type. When the two sub-groups are combined, as seen in Table VII., the figures read, cellular 86 per cent., acellular 13 per cent.

Group 5 contains the crania of 173 aboriginal Australians, an essentially Dolichocephalic people. In a fair proportion of the skulls, the mastoid process is of the acellular type. Of the 346 temporal bones in the series, 281 or 81 per cent. are cellular, and 65 or 18 per cent. are acellular.

Up to this point, the analysis of Table VII. supports the conclusion already reached by a study of the figures on Tables V. and VI., namely, that the acellular type of mastoid process is met with more often in the Dolichocephali than in the Brachycephali, and that, in the Brachycephalic skulls of the relatively pure races, a larger proportion of the mastoid processes are pneumatic than in the same form of skull amongst the mixed European peoples.

Group 6, however, contains a small number of Eskimo crania obtained in Greenland and on some of the islands adjacent to the North American Continent. The Eskimos are a more or less pure Dolichocephalic race, but the atypical character of some of the skulls found near the coast is evidence of some intercrossing with outside peoples. Two or three Mesaticephalic skulls approximating to the short-headed form occur in the series under examination. With one exception, all the mastoid processes are pneumatic, giving a percentage of 97 for the series of nineteen skulls. It is unfortunate that the group contains so small a number of crania, but the well-developed pneumatic processes occur so consistently throughout the series, that there would appear to be justification in assuming that, with even a larger number under examination, the pneumatic type would still be identified. The group, as it stands, furnishes evidence of an exceptional arrangement in the relationship of the two types of mastoid process in Dolichocephalic crania.

Groups 7 and 8 are, perhaps, the most interesting of the series. The islands of the Pacific Archipelago are inhabited by two distinct races of men, the Papuan-Melanesians occupying New Guinea and the islands to the north and west of the Archipelago, and the Polynesians to the south and east. These two peoples, while differing from each other in several of their physical characters, such as in the pigmentation of the skin and the character of the hair, are further differentiated in the

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type of skull. The Melanesian is Dolichocephalic, the Polynesian, Brachycephalic. Upon many of the islands, skulls of an intermediate type are found, some of which approach more closely to the long-headed type, while others possess more distinctly the characters of the short-heads. There is thus ample evidence of the intercrossing of the two races. In each of the two Groups 7 and 8, the three types of skull are represented. Of the crania examined, 51 belong to the islands associated with the Melanesian population and 72 with those inhabited by the Polynesians, giving a total of 123 crania. Of the 246 mastoid processes, only three are of the acellular type. The percentage of cellular processes is thus 98, similar to that obtained in the Brachycephalic skulls of the aborigines of North and South America (Group 2). Table VIII. has been prepared in order to show the relation of the mastoid types to the three forms of skull found in the Pacific Islanders. The table is based upon the examination of 120 crania, as it was impossible to measure the cephalic index in three of the series.

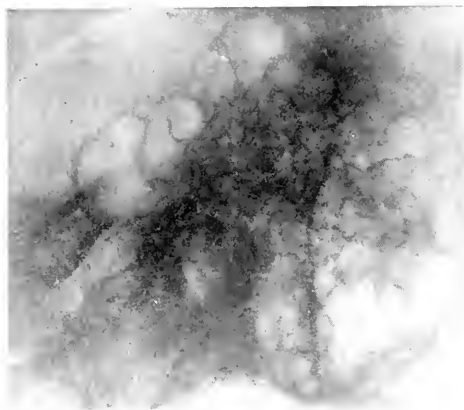
TABLE VIII.

*Papuan-Melanesian and Polynesian Oceanic Crania, 120.*

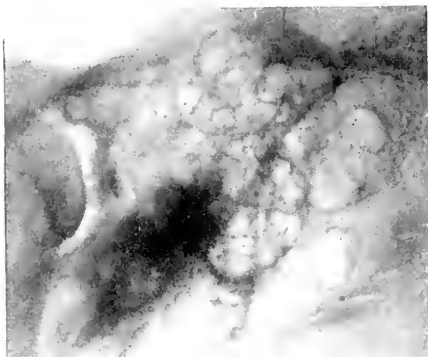
(Dolichocephalic Melanesian—Brachycephalic Polynesian—  
Mesaticephalic Crania from intercrossing.)

Crania.		Cellular Processes.	Acellular Processes.	Skulls with Asymmetrical Processes.
Dolichocephalic	68	136 100 per cent.	0	2 2 per cent.
Mesaticephalic	30	60 100 per cent.	0	0
Brachycephalic	22	41 93 per cent.	3 6 per cent.	2 9 per cent.
Total	120	237 98 per cent	3 1 per cent.	4 3 per cent.

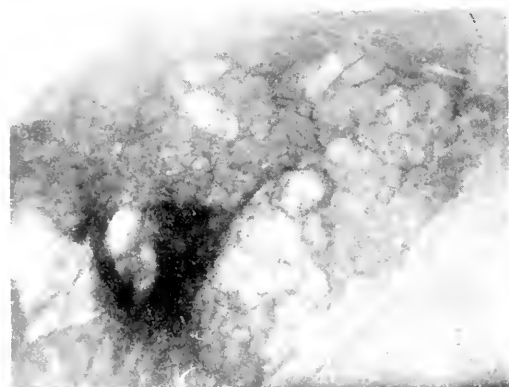
We are not prepared to give an explanation of the almost entire absence of the acellular mastoid process in a series of crania more than half of which have a Dolichocephalic index. It is relevant to the point, however, to investigate the size of the frontal air sinuses in the skulls of the same people, and to ascertain whether these cavities present any unusual development. In *The Accessory Sinuses of the Nose*, published



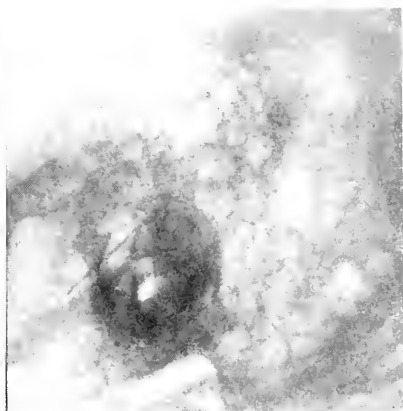
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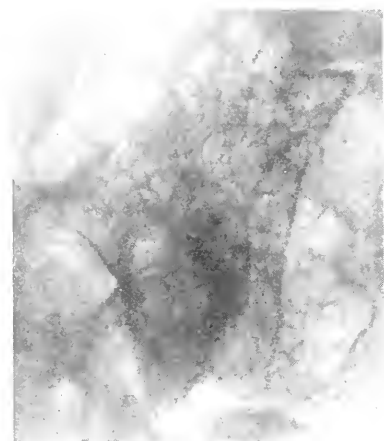
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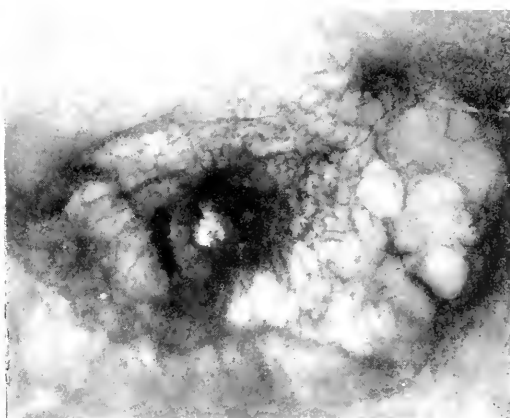
3



4



5



6

LEFT MASTOID PROCESSES SHOWING CELLULAR DEVELOPMENT.

- |                           |                       |                   |
|---------------------------|-----------------------|-------------------|
| 1. Burmese.               | 2. Australian.        | 3. Eskimo.        |
| 4. Native of New Britain. | 5. Sandwich Islander. | 6. New Hebridean. |



## Structural Type of the Mastoid Process

in 1901 by one of us, 70 crania belonging to the Sandwich Islanders and Maoris were examined. Throughout the series, the frontal sinuses both in their average height and breadth measurements were below the mean of the sinuses measured in the European crania and in the other races examined, while the percentage of skulls in which one or both frontal sinuses were absent was higher than amongst the Europeans and the majority of the other races (see Table XIII., p. 174).

Groups 9, 10, and 11 on Table VII. may be very briefly commented upon. They comprise 233 crania belonging to a number of races inhabiting the African continent and the mountainous districts in India and Ceylon. Of the Egyptian crania (Group 9), 24 in number, one half are Dolichocephalic, the other half Mesaticephalic, but with a strong Dolichocephalic strain. In a group characterised by an entire absence of Brachycephalic crania and with a mean Dolichocephalic index, the percentage of pneumatic mastoid processes is high, the figures reading, cellular 91 per cent., acellular 8 per cent.

In Groups 10 and 11, containing the remaining 209 skulls, 109 or slightly more than half are Dolichocephalic, 23 are Brachycephalic, and 75 are Mesaticephalic, a number of the latter approximating to the long-heads, a smaller proportion to the short-headed form. The prevailing type of skull is undoubtedly Dolichocephalic, and several of the tribes, such as the African Negroes, Kaffirs, and Hottentots, the Dravidians of India and the Veddahs of Ceylon, are of the pure Dolichocephalic type. The relative proportion of the two types of mastoid process in a series of skulls in which there is a considerable intermingling of the three-head forms, but with the Dolichocephali predominating, is as follows:—Cellular processes 84 per cent., acellular 15 per cent. The figures are in accordance with the results obtained in relatively pure Dolichocephalic races.

The Tasmanian crania in Group 12 are only three in number, consequently they do not permit of any generalisation being made.

While the above analysis shows that the acellular type of mastoid process, with certain exceptions, is met with more frequently in the Dolichocephalic crania, and that the pneumatic process predominates in the Brachycephalic, another fact is revealed. The acellular forms occur in a higher percentage in the Dolichocephalic skulls of the mixed European peoples

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than in the Dolichocephalic crania of the relatively pure races. Similarly, the pneumatic processes have a higher percentage in the Brachycephalic crania of the latter races than in the same type of skull amongst the mixed Europeans. Tables IX. and X. have been compiled to illustrate these points more graphically.

TABLE IX.

*Cellular and Acellular Mastoid Types and Asymmetry in 287 Dolichocephalic Crania of relatively Pure Dolichocephalic Races.*

Dolichocephalic Crania.	Cellular.	Acellular.	Asymmetrical.
1. Australians, Melanesians, Philippinos, Dravidians and Veddahs, Eskimos, African Negroes . . . . . 287	499 86 per cent.	75 13 per cent.	35 12 per cent.
2. Philippinos, Dravidians and Veddahs, Eskimos, African Negroes . . . . . 59	104 88 per cent.	14 11 per cent.	8 11 per cent.
3. Australians . . . . . 160	259 80 per cent.	61 19 per cent.	25 15 per cent.
4. Melanesians . . . . . 68	136 100 per cent.	0	2 2 per cent.
5. Dolichocephalic Europeans . . . . . 65	99 76 per cent.	31 23 per cent.	15 23 per cent.

TABLE X.

*Cellular and Acellular Mastoid Types in 105 Brachycephalic Crania of relatively Pure Brachycephalic Races.*

Brachycephalic Crania.	Cellular.	Acellular.	Asymmetrical.
1. North-American Indians, Chilians, Peruvians, Burmese, Chinese, Siamese, Malays, Andamanese, Polynesians . . . . . 105	203 96 per cent.	7 3 per cent.	8 7 per cent.
2. North-American Indians, Chilians, Peruvians, Malays, Andamanese . . . . . 54	107 99 per cent.	1 1 per cent.	2 3 per cent.
3. The Mongolians . . . . . 29	55 94 per cent.	3 5 per cent.	5 17 per cent.
4. The Polynesians . . . . . 22	41 93 per cent.	3 6 per cent.	2 9 per cent.
5. Brachycephalic Europeans . . . . . 85	144 84 per cent.	26 15 per cent.	8 9 per cent.



# Structural Type of the Mastoid Process

On Table IX. only the Dolichocephalic crania have been selected from the relatively pure long-headed races, all Mesaticephalic forms being discarded, and the Dolichocephalic European skulls have been placed at the bottom of the table for purposes of comparison. The same procedure has been adopted on Table X., which deals with the Brachycephalic crania, the Dolichocephalic and Mesaticephalic forms of skull being excluded. The Brachycephalic Europeans are presented for comparison.

## *Summary of Anthropological Investigation.*

Certain general conclusions may be drawn from the facts ascertained in this section of the investigation.

1. That the cellular and acellular mastoid processes occur generally in the three skull forms in a definite relationship; the percentage of cellular processes being lowest in the Dolichocephalic crania, and highest in the Brachycephalic; while they occupy an intermediate position in the Mesaticephalic skulls. The reverse is true of the acellular processes in their relation to the long and short heads.

2. That there may be certain racial exceptions to the above possibly amongst the Eskimos, and in the Melanesian and Polynesian crania, in which the cellular processes greatly predominate, irrespective of the type of skull.

3. That in the Dolichocephalic and Brachycephalic crania of the relatively pure races, there is a higher percentage of cellular mastoid processes than in the same types of skull in the mixed European peoples.

(c) **A Comparison of the Mastoid and Frontal Air Spaces in Crania of a Similar Cephalic Index and in the Skulls of Various Races of Mankind.**—The concluding part of our anthropological research deals with a comparative examination of the mastoid air spaces in the temporal bones and the pneumatic sinuses in the two halves of the frontal bone. The investigation into the racial characteristics of the frontal air sinuses was carried out in 1898-99, upon the same craniological collection as that now utilised in the mastoid research. The examination was undertaken, however, before the X-rays had become generally employed, and the results were arrived at, partly by transillumination of the sinuses, and partly by dissection, and the conclusions were based upon an examination

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of 578 crania. Sufficient material is provided to enable us to draw certain conclusions with regard to the comparative development of the two sets of air spaces as they are found both in the three main skull types and in a number of the races of mankind dealt with in both investigations.

The comparison is based mainly upon the presence or absence of one or both frontal sinuses. The frontal sinus is the equivalent, in the frontal bone, of the pneumatic type of mastoid process in the temporal bone, while the absence of the sinus is comparable with the acellular type of mastoid process, diploëtic osseous tissue being present in both areas. The size of the frontal sinuses, as expressed in their height and breadth measurements, can be accurately ascertained, but, unfortunately, there is no exact method of measuring the area covered by the pneumatic cells in the mastoid process. Nevertheless, a knowledge of the average size of the frontal sinuses provides information which can be utilised to some extent in a comparative study of the frontal and mastoid air spaces.

The cephalic index was ascertained in 525 of the skulls examined in the frontal sinus investigation. Of these, both sinuses were absent in 80 crania, while one sinus, the right or the left, was absent in 63 crania. Hence, one or both cavities were absent in 143 or 27 per cent. of the crania of known cephalic index. Of 231 Dolichocephalic skulls in the series, 74 or 32 per cent. were without one or both frontal sinuses; of 182 Mesaticephalic skulls, 46 or 25 per cent. had one or both sinuses absent; and in 112 Brachycephalic crania, there were 23 or 20 per cent. without one or both frontal cavities. These figures demonstrate, therefore, that the frontal sinuses, like the pneumatic mastoid processes, are most often absent in the Dolichocephalic crania, least frequently absent in the Brachycephalic skulls, while the absence of the sinuses occupies an intermediate position in the Mesaticephali. The absent frontal sinus or "acellular" type, therefore, bears a relation to the three main forms of crania similar to that of the acellular type of mastoid process. Table XI. illustrates these points.

A further illustration of the facts just recorded is furnished by an examination of certain of the races which are characterised by a Dolichocephalic or Brachycephalic type of skull. Thus, amongst the long-headed Australians and Eskimos, and in the Kaffirs, Negroes, and Hottentots, the percentage of absent frontal sinuses is very high; whereas in the short-headed

# Structural Type of the Mastoid Process

American Indians, and amongst the Mongolians, the percentage of "acellular" types is much lower.

TABLE XI.

*Comparison between the Occurrence of the Acellular Type of Frontal Sinus Area and the Acellular Mastoid Type in Dolichocephalic, Mesaticephalic, and Brachycephalic Crania.*

	Crania.	Absent Frontal Sinus.	Crania.	Acellular Mastoid Process.
Dolichocephalic .	231	74 or 32 per cent.	448	129 or 14 per cent.
Mesaticephalic .	182	46 " 25 "	305	85 " 13 "
Brachycephalic .	112	23 " 20 "	216	43 " 9 "

One additional point in connection with the occurrence of the acellular or absent frontal sinus must be referred to. The investigation shows very clearly that the frontal sinus is less frequently absent in the crania of the mixed European races than in skulls of the relatively pure races. The absence of one or both sinuses was noted in 17 per cent. of 240 European crania examined, and in 35 per cent. of 321 crania of the relatively pure races. In the case of the mastoid process, on the other hand, the converse was observed, the acellular type of bone being found in a considerably higher proportion of the European crania than in the skulls of the relatively pure races. These points are brought out in Table XII.

TABLE XII.

*Comparison between the Occurrence of the Frontal Sinuses and Mastoid Air Cells in the Mixed European Peoples and the relatively Pure Races.*

Races.	561 Crania.	Frontal Sinuses.		1000 Crania.	Mastoid Processes.	
		Frontal Sinuses.	Acellular or Absent.		Cellular.	Acellular.
		Per cent.	Per cent.		Per cent.	Per cent.
Mixed Europeans	240	82	17	300	79	20
Relatively Pure Races.	321	64	35	700	88	11

The frontal sinuses, like the cellular mastoid processes, attain no distinctive size which can be said to be peculiar to any type of skull or to any race. The frontal sinuses, like

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the mastoid cell area, show marked variations in size in individual skulls in the majority of races, and their average height and breadth measurements are subject to some degree of variation. A calculation based upon the examination of several hundred frontal cavities represents an average or standard sinus as measuring 31.6 mm. in height and 25.8 mm. in breadth. The largest individual sinuses were observed in the Brachycephalic American Indians, and in the Burmese and Chinese crania, but the average dimensions of the sinuses in these races were not so large as in the English and Irish and in the Continental Europeans. The mean measurements in the Dolichocephalic Australian crania, in which the sinuses are so frequently absent, exceeded those of the sinus of average size, but they were smaller than the average obtained in a series of Irish crania possessing a Dolichocephalic strain. The frontal sinuses in the mixed European crania, whether Dolichocephalic, Mesaticephalic, or Brachycephalic are of large average size, and are more frequently present than the same cavities in the relatively pure races and in the skull types constituting these races.

TABLE XIII.

*The Percentage of Skulls in which one or both Frontal Sinuses are absent in a Series of 561 Crania and the Average Height and Breadth Measurements of the Frontal Sinuses.*

Races.	Mean Cephalic Index.	No. of Crania.	Skulls with one or both Sinuses Absent.	Frontal Sinuses.		
				Average Height.*	Average Breadth.*	
Scottish . . . .	M. + B.	124	29 or 23 $\frac{1}{2}$ %	29.8	26.6	Av. H.
English and Irish .	M. + D.	36	2 " 5 $\frac{1}{2}$ %	34.4	30.6	32.5
Continental Europeans	B.	85	10 " 12 $\frac{1}{2}$ %	33.3	27.8	Av. B. 27.7
N. and S. American Indians and Fuegians	B.	41	11 " 26 $\frac{1}{2}$ %	32.3	23.0	
Burmese, Chinese, Siamese	B.	61	11 " 18 $\frac{1}{2}$ %	30.6	23.9	Av. H. 30.7
Australians . . .	D.	69	31 " 44 $\frac{1}{2}$ %	33.6	26.4	Av. B. 23.8
Eskimos . . . .	D.	19	10 " 52 $\frac{1}{2}$ %	29.1	23.6	
Melanesians and Polynesians	D.M.B.	70	32 " 45 $\frac{1}{2}$ %	29.3	22.1	
Egyptians . . . .	D.	20	4 " 20 $\frac{1}{2}$ %	32.0	24.2	
Kaffirs, Hottentots, Negroes, Bushmen	D.	41	16 " 39 $\frac{1}{2}$ %	30.2	26.5	

\* Expressed in millimetres.

## Structural Type of the Mastoid Process

The remarkable occurrence of cellular mastoid processes found throughout the series of 123 Melanesian and Polynesian crania (Table VIII.) presents, as we have already pointed out (page 168), no parallel in the case of the frontal sinuses of the same races. Indeed, not only is the percentage of absent frontal sinuses greater in these races than in any of the others examined, but the sinuses which are present show smaller average height and breadth measurements than the frontal cavities in any of the other races. There is no evidence, therefore, that the skulls of these particular races have any special development of air spaces generally in the cranial box.

Table XIII. has been prepared with the object of recording graphically the various points referred to in the preceding paragraphs; the various races examined being placed in the first column, the acellular types or absent frontal sinuses being shown in the fourth, while the average dimensions of the cavities are represented in the columns under Frontal Sinuses.

### *Summary of Conclusions regarding a Comparison between the Mastoid and Frontal Air Spaces.*

1. That the "acellular type," or absent frontal sinus, like the acellular mastoid process, occurs more frequently in the Dolichocephalic than in the Brachycephalic crania, while it occupies an intermediate position in the Mesaticephalic skulls: or, to put it conversely, the frontal sinus, like the cellular mastoid process, is found more often in Brachycephalic than in Dolichocephalic crania.

2. That the frontal sinuses, both as regards their average height and breadth measurements and the frequency of their occurrence, are better represented in the crania of the mixed European peoples than in the skulls of the relatively pure races; the cellular mastoid processes, on the other hand, occur in a higher percentage of the crania of the relatively pure races.

3. That there is no evidence, either in individual skulls or in groups of skulls, that the frontal sinuses and the cellular mastoid spaces attain a similar degree of development.

4. That while the frontal sinuses attain a remarkable size in certain individual crania of the Brachycephalic races, in no group of skulls can their development be regarded as assuming a racial characteristic, such as the cellular mastoid process appears to acquire in the Dolichocephalic Melanesian and the Brachycephalic Polynesian crania.

## THE INFLUENCE OF TOXIC AGENTS UPON THE NASAL MUCOSA.\*

By NEIL MACLAY, Newcastle-upon-Tyne.

THE subject which I bring to your notice is a hypothesis based for the most part upon the foundation of clinical experience; but there is some reason for the belief that it may be able to stand the test of investigation in the laboratory as well as at the bedside.

For a good many years it has been my conviction that some of the common intra-nasal phenomena cannot be regarded as the outcome of physical defects in the nose or entirely due to microbic infection in the nose or nasal accessory sinuses, and that such phenomena can only be explained by the theory that they are the local manifestations of some general state.

Such conditions as spasmodic rhinorrhœa and sneezing, the so-called and perhaps ill-named "vasomotor rhinitis" and the non-infective cold, seem to justify the assumption that some blood-borne element of bio-chemical origin may be the root cause.

The nasal mucosa and the turbinal vascular system are peculiarly sensitive to a variety of local and general stimuli and give rise to many troublesome and distressing symptoms, which too often baffle the therapeutic ingenuity of the rhinologist. It may be that our treatment of the nose is not always based upon a sound pathology. Skilful hands may rectify completely intra-nasal deformities such as the deflected septum, spur, or crest, and yet the operation may not be followed by the relief which had been anticipated. In the same way the removal of tonsils and adenoids may be fraught with disappointment and the recurring head colds and nasal stuffiness, etc., unaltered in their character or frequency.

It has been suggested by some clinicians, and notably by Watson Williams, that a latent type of accessory sinusitis, commonly unrecognised, explains much of our failure to cure such persistent catarrhal symptoms in the nose.

For my own part, careful investigation of the accessory sinuses, with disinfecting and draining precautions, have not

\* Paper read at the Fourteenth Meeting of the Scottish Otological and Laryngological Society, 10th December 1921.

# Influence of Toxic Agents on Nasal Mucosa

brought about the relief which had been hoped for in all such circumstances.

Then, again, we are all familiar with the type of case where after an efficient operation for the removal of pus from a nasal sinus and adequate ventilation of that sinus, muco-pus continues to flow in spite of liberal intra-nasal medication, and it may be autogenous vaccination, while other cases of apparently identical character dry up and "cure" in a reasonable time after some simple operative effort.

My thesis is that in all those cases there is an underlying element of a bio-chemical or toxic nature which is not influenced in any great degree by the removal of the obstruction or anatomical deformity or the evacuation of the local purulent focus and that this systemic agent perpetuates the symptoms.

This susceptibility of the nose to toxic products I am inclined to think begins very often in the earliest period of life and may be held responsible for the catarrhal conditions in the nose which make their appearance in infancy and lead to a disturbing train of symptoms. Apart altogether from the congenital syphilitic snuffle there are a great many babies who more often than not have wet noses, with congested nasal mucosa and the accompanying respiratory embarrassment.

And while the catarrhal process may only attract our attention to the nose, it may at the same time involve the Eustachian tube and middle ear with all the well-known consequences.

My observations suggest that the catarrhal state may and indeed often does precede the implantation and action of organisms in the nose. The reactionary condition of the mucous membrane is likely to favour the growth and activities of germ life in the nose and lead to the establishment of a superimposed infective inflammation.

The investigations regarding the causation of hay fever and the conclusions arrived at by Dunbar, Freeman and others, give some support to this view, for if the acute nasal symptoms of this distressing malady can be associated with the presence of certain vegetable products, it seems possible that other toxic agents, some of which may be conveyed through the blood stream, might exercise an equally potent effect.

The influence of animal emanations upon the nasal mucosa, though perhaps not so common, at least in the acute manifestation, as the action of pollen, is none the less striking and

## Neil Maclay

suggestive. I will later on give you some examples of cases where the influence of animal emanation upon the nose can hardly be disputed.

The discovery by Charles Richet, in 1902, of that mysterious bio-chemical process which he named anaphylaxis, opened up a new field of speculative thought which has culminated in the theory that bronchial asthma is due, if not entirely at least in some measure, to the subtle action of foreign protein introduced into the blood stream. I do not intend to enter into any detail regarding the subject of protein sensitisation, but I would like to draw your attention to one or two ascertained facts and the symptoms which are known to be associated with the condition :—

1. It is only animal and vegetable proteins which have the power to produce this peculiar reaction called anaphylaxis, and the protein must be foreign to the animal upon which it is used.
2. After the injection of a foreign protein, at least a week's interval must elapse before the injection of a second dose will cause the anaphylactic symptoms to appear. This interval of time seems necessary for the development of the sensitisation.
3. An animal sensitised by means of a certain protein will only give a reaction to the same protein.
4. Sensitisation may be congenital.

Among a long list of symptoms which have been noted as occurring in anaphylaxis, I wish to mention four :—

1. Irritation of the skin.
2. Œdema of the skin and mucous membrane.
3. Rhinorrhœa.
4. Spasm of the bronchioles, and swelling of the bronchial mucous membrane.

It is now generally admitted that hay fever is caused by sensitisation to the protein content in a variety of pollen, also that the symptoms produced by animal emanation are the result of a similar sensitiveness to the animal protein. There is some reason for going further and, on the basis of analogy, suggesting that the toxic influences which affect the nose may be the outcome of protein sensitisation to food or micro-organisms.



# Influence of Toxic Agents on Nasal Mucosa

Let me give you one or two examples of nasal reaction believed to be of animal origin :—

J. G., a boy of 13, was brought to me with the request that he should be examined for adenoids. The mother said he had been operated upon for tonsils and adenoids a few years ago, but his colds in the head and his stuffiness in the nose made her wonder if the adenoids had grown again.

Examination revealed an entire absence of faucial tonsils and post nasal lymphoid tissue.

The appearance of the interior of the nose and the history suggested to me a general, rather than a local cause for the symptoms, and after some inquiry I discovered that his nose always became affected when he went near a horse. Indeed, his mother said he presented a most distressing appearance whenever he rode to hounds. It may be this boy is so sensitive to horse protein than he is more or less constantly being subjected to irritation therefrom.

H., a boy of 10, I was asked to see on account of similar nasal symptoms. He had had his tonsils and adenoids removed, and one or two operations done on his nose, including a partial turbinectomy and cauterisation. No benefit had apparently been derived from these measures. His nose was very catarrhal. The inferior turbinates were tumified and œdematous looking, and the whole of the nasal mucosa was congested. There was a free secretion of mucus but no pus. Accessory sinus disease was excluded.

Inquiry revealed the fact that this boy was always greatly disturbed if he fondled the dog. His mother alleged that if he even entered a room or house where there was a dog, she was sure that it gave him a cold. The household dog has been sent away as well as some pigeons and rabbits, and I have heard from the family medical attendant that the boy is quite well.

Mrs A., aged 30, the wife of a farmer, was sent to me on account of persistent nose symptoms of a catarrhal nature. Her doctor thought the removal of her turbinates might do her good. She was a healthy-looking woman who led an active and very largely open-air life, and who had no health troubles or discomforts apart from frequent head colds and nasal stuffiness. On examination, the mouth, fauces, and post nasal space appeared normal. The nose anteriorly showed some fulness of the inferior turbinates, with alteration of the surface epithelium, but no pus and no œdema. The nose was of the wet type.

It was found that in her case contact with a horse produced at once symptoms of acute nasal disturbance—indeed this was so pronounced that she was afraid to take a two-mile journey

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to the railway station in a horse-drawn conveyance. It would, I fancy, be well-nigh impossible for this woman, having regard to the nature of her life, to avoid contact with horse emanation to some extent day by day, so we might very easily anticipate a more or less constant irritation of the nose.

The following histories illustrate other types of toxic irritation, and they are taken from a large number which I have had the opportunity of noting in detail:—

J. C., a boy, aged 16, was sent to me to arrange for the removal of his tonsils and adenoids, which were unmistakably unhealthy. He gave a history of recurring colds in the head, together with stuffiness, and even obstruction, which came and went at intervals. There was no gross obstruction in the nose and no evidence of any septic focus, his inferior turbinals were full and rather pale, with an appearance which suggested œdema. After some inquiry, I submitted this boy to the protein skin-test and found as a result that he produced a well-marked reaction to egg and beef. I then learned from the boy himself that he had noticed that his nose was always troublesome after he had eaten eggs, and that, in addition to the nose trouble, he got itching spots on his skin.

A ship's captain upon whom I had performed a sub-mucous resection for an obstructive deflection of the septum two years ago, complained to me recently that he still had trouble with his nose when at sea, particularly sneezing and stuffiness. On examination the physical result of the operation seemed quite good, and there did not appear to be any objective cause for his symptoms. He readily admitted that he was all the time quite comfortable when living at home, and that his trouble began only after he had been to sea for a day or two. I found this man sensitive to oats and eggs, and discovered that while he never ate eggs or porridge at home, he always partook of those two things pretty liberally when at sea. He was advised to abstain from eggs and porridge, and four months later he reported that he had carried out instructions to the letter and had remained entirely free from nasal symptoms.

J. B., a baker, whose nasal septum I resected a year ago on account of a completely obstructive deflection, consulted me recently about the persistence of nasal symptoms which he had expected to get rid of after the operation. Apart from some turbinal fulness I could find no fault with his nose.

After some inquiry it became evident that he suffered no

# Influence of Toxic Agents on Nasal Mucosa

inconvenience so long as he kept away from the baking-house. It is just possible that this man may be sensitive to wheat protein. He was not tested as I had no material at the time.

T. Y., a young man aged 25, complained of mucus dropping into his throat, discharge from the nose and recurring nasal obstruction, which was most troublesome at night. He gave a history of nasal cauterisation on four separate occasions, including one in Glasgow, and would not admit to having received any benefit. He wanted something removed from his nose, and would readily have submitted to turbinectomy. There was no defect in the nose other than what had been caused by the cautery, which had evidently been applied pretty freely. He gave a strong skin reaction to beef and a reaction to egg. Operative treatment was not advised, and nasal douching was discouraged.

A. B., aged 22, complained of hissing noise in the right ear for two years, and what he described as continual catarrh in the nose. During the past eighteen months his tonsils and adenoids had been removed, and a submucous resection of his septum had been done in London. His ear still hissed, and his nose symptoms, though modified, continued to be a source of trouble. Examination revealed excellent post operative results in the nose and throat, and no objective signs of intra-nasal disease. He yielded a strong cutaneous reaction to egg, and declared that eggs had been his chief food during past years, as his landlady was a very poor cook.

A. F., a young man of 26, gave a long history of nasal discomfort. He had been operated upon several times by rhinologists of repute, and had douched and sprayed with many things. His catarrhal symptoms disappeared when he was put upon a suitable diet and given intestinal antiseptics, with instructions to leave his nose severely alone.

In this type of case the nose seems to be hypersensitive to many things. Operative interference of any kind is followed by an exaggerated reaction, and even the blandest douches and sprays appear often to aggravate and perpetuate the symptoms.

While opinions must of necessity vary to some extent in the interpretation of clinical evidence, it is to be hoped that this communication may stimulate the study of intra-nasal phenomena from a general rather than a purely local point of view.

## THE COURSE AND RELATIONS OF ARNOLD'S NERVE (AURICULAR BRANCH OF THE VAGUS) IN THE TEMPORAL BONE.\*

By ALBERT A. GRAY, M.D.

IN the *Journal of Anatomy and Physiology* (xlvii., p. 391), I published a short paper on the "Comparative Anatomy of the Middle Ear." Among other subjects in that paper, I demonstrated the existence of a large plexus of nerves on the posterior surface of the tympanic bulla in several mammals of different orders. On account of its anatomical position, I named the structure the bullar plexus. The plexus was clearly composed of branches from at least two nerves, the facial and the vagus, and probably branches from the glossopharyngeal also took part in its formation. The existence of this structure in several mammals of different orders appeared to me to indicate that it was probably represented in man, but had hitherto escaped discovery on account of the difficulties of making a satisfactory dissection of that region in the human subject. This conjecture has proved to be justified, and it is possible to demonstrate the existence of this plexus in man, though it is a much smaller and more elusive object in him than in the other mammals referred to previously.

Before going on to demonstrate the plexus itself, it is important to refer briefly to the striking anatomical differences in this region between man and the anthropoid apes on the one hand, and all other mammals on the other hand.

In the first place, the mastoid process exists only in man and the anthropoid apes. The tympanic bulla, on the other hand, in these animals is reduced to an insignificant little cul-de-sac lying below and behind the tendon of the stapedius muscle, and termed in the human subject the tympanic sinus. In all other mammals the state of matters is, so to speak, reversed—that is to say, the mastoid process does not exist and the bulla is a large cavity; in many mammals, indeed, it is considerably larger than the rest of the middle-ear cavity.

It must further be pointed out that the course of the facial nerve in this region is external to the bulla, but internal to

\* Paper read at the Section of Otology, Royal Society of Medicine, 17th November 1921.

## Arnold's Nerve in the Temporal Bone

the mastoid process. Consequently, the development of the mastoid process in the anthropoid apes and man, associated with the retrograde evolution of the bulla, has produced a considerable change in the anatomical relationships of the facial nerve and adjacent structures. Thus the facial nerve assumes a much more nearly vertical position before it escapes from the base of the skull. The stapedius muscle also assumes a lower position, being no longer found above the bend of the facial nerve, but lying below that bend and partially under cover of it. Similarly the bullar plexus is found at a relatively lower level, and incidentally it may be noted that it has become smaller in size and less complex. The bullar plexus, indeed, in the human subject consists of the communications of Arnold's nerve (the auricular branch of the vagus) with the facial nerve, and in some cases at least with the chorda tympani.

As the result of investigations carried out by myself the mutual relationships of Arnold's nerve, the facial nerve, and the chorda tympani are found to differ considerably from the descriptions given in standard anatomical works such as Quain, Spalteholtz, and Gray. I propose to give the results of these researches in the following short note. These results so far as they have gone are of the nature of a destructive criticism of the teachings at present accepted, rather than of a full description of the actual relationships. The reason for this is that the course of Arnold's nerve varies considerably in different subjects, and, owing to the small number of specimens examined, it is not possible to say definitely what is to be considered the typical relationship, and what is to be considered a variation. The recent development of the mastoid process in mammalian evolution, which has just been referred to, is doubtless the reason why these variations are so common in this region.

The first specimen examined shows the following facts as regards the course of Arnold's nerve. The nerve enters the temporal bone on the external surface of the jugular fossa as ordinarily described, and runs horizontally outwards and backwards until it reaches the facial nerve. At that point a small twig unites it with the facial nerve. Turning round the posterior aspect of the facial nerve, it continues outward for a very short distance (about 1 mm.), and at the same time bends forwards and a little downwards, until it comes to be immediately behind the chorda tympani. At this point these two nerves

## Albert A. Gray

are in close actual contact, and probably nerve fibres pass from one to the other, though of course this could only be definitely settled by microscopic examination. After this junction, Arnold's nerve turns more abruptly downwards until it is almost vertical. It continues downwards and leaves the bone through a small foramen a millimetre or two external to the stylo-mastoid foramen. It then passes outwards along the lower surface of the temporal bone for a distance of 1 or 2 mm. until it reaches the cleft between the mastoid process and the bony rim of the external auditory meatus. Its course is then almost vertically upwards. In some specimens this vertical portion lies in the cleft just mentioned, but in others the nerve re-enters the temporal bone through a foramen which leads into a minute but long canal. This canal in its upper portion turns inwards and opens on the posterior wall of the meatus; and the nerve then terminates on the posterior wall of the meatus and on the tympanic membrane as described in anatomical text-books.

A second type in regard to the course of Arnold's nerve is found, in which the nerve passes outwards along the lower surface of the temporal bone without apparently penetrating the bone. That is to say, it runs onwards and crosses behind the facial nerve just as the latter leaves the stylo-mastoid foramen. At this point it gives off a branch to the facial nerve and also receives one from the latter; the second of these branches leaves the facial nerve at the same point as does the chorda tympani, and it may be that it actually does come from the chorda tympani. In this particular respect, therefore, the relationship of the chorda tympani and Arnold's nerve would nearly coincide with that found in the first type, the only difference being that the connection between the chorda tympani and Arnold's nerve occurs lower down and quite close to the origin of the former.

Finally, in a third type, Arnold's nerve appears to arise direct from the chorda tympani by two twigs, which unite immediately after leaving the latter, to form one nerve which runs first outwards and then turns downwards to escape at the foramen mentioned when describing the first type. It may be, however, that in this third type another portion of Arnold's nerve may exist which may have been broken away in making the preparation from which the above description has been taken.

## Arnold's Nerve in the Temporal Bone

**Conclusions.**—The present investigation can only be looked upon as a preliminary survey of the region to be explored ; but, as shown above, a sufficient number of facts have come to light which indicate clearly enough that the description of the course and relations of Arnold's nerve as given in the standard anatomical text-books is quite inadequate and probably quite incorrect. It is evident, further, that considerable variations occur in the course and relationships of this nerve. On account of the small number of cases examined, it is not yet possible to say which is the most common type and which are to be regarded as variations from that type.

# SOME OBSERVATIONS ON THE EARLY DIAGNOSIS AND DRAINAGE OF OTITIC MENINGITIS

ILLUSTRATED BY FOURTEEN CASES AND SPECIMENS.\*

By E. D. D. DAVIS, F.R.C.S.

THE 14 cases described were fatal and *post-mortem* examinations were made in 12. Purulent meningitis was found in the posterior cranial fossa, and a collection of pus between the tentorium and the cerebellum and in the interpeduncular space and the pituitary fossa. In advanced cases the meningitis had spread along the sylvian fissures. The cisterna magna in some cases was free from pus.

The path of infection, in 8 cases, was traced through the fenestra ovalis, the labyrinth and internal auditory meatus to the under surface of the pons or to the interval between the cerebellum and the tentorium. In one case the pus was found at the aqueduct of the vestibule reaching it along the saccus endolymphaticus.

The *post-mortem* findings demonstrated also the most direct route of drainage, namely, through the labyrinth and internal auditory meatus, or through the inner wall of the mastoid cavity internal to the lateral sinus.

**Diagnosis.**—With the labyrinth as the pathway of infection, definite symptoms of labyrinthitis preceding the signs of an established meningitis were found in 6 of the cases.

Early diagnosis of otitic meningitis is essential, if success in treatment is to be looked for.

The irritative symptoms denoting a labyrinthitis preceding the meningitis were vertigo, sickness, and nystagmus; the patients complained of headache and pain; the temperature was 99° F. or normal. Loss of function and destruction of the labyrinth followed.

The cerebro-spinal fluid in the irritative stage may be normal, but more frequently there is a polymorphonuclear leucocytosis, but the fluid is still sterile.

With the onset of symptoms of manifest meningitis, such as severe headache, vomiting, and neck rigidity, the cerebro-spinal

\* Epitome of paper read at the Section of Otolaryngology, Royal Society of Medicine, 17th November 1921, and published in *The Medical Press and Circular*, 30th November 1921.



## Early Diagnosis of Otitis Meningitis

fluid is turbid and contains pus cells: an immediate leucocyte count is necessary and is of more value than a bacteriological examination, as the cerebro-spinal fluid is frequently sterile. The tests for acidity and Fehling's test proved unreliable.

**Treatment.**—In the first stage of labyrinthine symptoms, labyrinthotomy is likely to be successful: if the labyrinth is dead, there should be no hesitation regarding it. In the irritative stage, the decision is not so easily made, because the symptoms may disappear after the performance of the mastoid operation. In 3 of the cases in the series a fulminating meningitis developed four days, eleven days, and three weeks after the mastoid operation for acute suppuration, and it is in this type of case that it is difficult to decide on labyrinthotomy before the onset of meningitis.

If signs of meningitis have developed, drainage through the internal auditory meatus is obtained, after opening the labyrinth, by firmly thrusting the narrow end of a Ballance mastoid curette inwards and slightly forwards through the fenestra ovalis, directing the concavity of the curette forwards.

If there is not a free flow of cerebro-spinal fluid, further drainage should be carried out through the plate of bone between the lateral sinus and the labyrinth.

Drainage through the above two routes has proved more satisfactory in this series of cases, where the diagnosis was clearly established, than the more formidable and dangerous craniectomy of the posterior fossa, because the access to the collection of pus is more direct.

**Conclusions.**—(a) Given a case of acute and virulent streptococcal suppuration of the middle ear and mastoid with symptoms of labyrinthine irritation, a lumbar puncture should be performed first, and at the same sitting the drum-head incised and a simple mastoid operation done.

(b) If the labyrinthine symptoms do not subside in forty-eight hours, and the cerebro-spinal fluid shows a leucocytosis, then the radical mastoid operation, a simple labyrinthotomy through the promontory and a second lumbar puncture should be carried out.

(c) Failing improvement, and if signs of meningeal infection develop, then the posterior fossa is to be drained through the internal auditory meatus and by removal of the plate of bone internal to the lateral sinus.

## CLINICAL RECORD

### A CASE OF MALIGNANT DISEASE OF THE NASO-PHARYNX.

By J. HARRISON, M.B., Newcastle-upon-Tyne.

As no specimen of the growth was taken, for cosmetic reasons, it is impossible to record its exact nature. Probably an endothelioma, though sarcoma cannot be excluded, the case illustrates the great malignancy of such growths occurring in this region and the extraordinary local effect of radium.

Miss ——— aged 61, first noticed a small, glandular swelling in the left side of the neck in December 1920. This was fomented and rubbed with Iodex, and a septic tooth, which was thought to be the cause, was extracted. In spite of this the gland continued to enlarge, and on 15th April 1921 was removed by a surgeon in another town. The pathologist's report was:—"The gland has been cut in almost serial section, and shows a marked distension of the lymph sinuses, with large, pale, endothelial cells, and an atrophy of the lymphoid elements. The gland suggests reaction to a chronic irritant. There is no evidence of tubercle or malignant disease."

During convalescence she had attacks of sharp pricking pain "at the back of the throat," and noticed slight deafness in the left ear. She also began to have some nasal obstruction and occasional slight epistaxis, and the voice became nasal in tone. A very rapidly growing tumour appeared in the neck, and she began to have discomfort rather than difficulty in swallowing. On 24th May her doctor sent her to consult me. There was then a firm and slightly movable mass extending above the angle of the jaw to the level of the lobule of the ear, and midway between the posterior border of the sternomastoid and external occipital protuberance. It extended two-thirds of the way down the neck and was roughly pear-shaped. The soft palate was pushed downwards and forwards on this side, and a firm globular swelling could be felt filling the left side of the nasopharynx, and extending to the middle line.

There was no paralysis of any muscles, no anæsthesia, no neuralgia.

On 29th May a tube of radium bromide containing 50 mgms. was buried in the naso-pharyngeal growth, and three other tubes, each containing 30 mgms., were inserted into the upper part of the growth in the neck. There had been some suppuration after the

# Malignant Disease of the Naso-Pharynx

removal of the gland in April, and the sinus was used to insert one of the radium tubes. The tubes were removed in twenty-four hours and inserted through punctures made with a tenotome into the lower part of the tumour. In spite of its rapid growth it was very firm, and had to be incised with a tenotome to enable the tubes to be buried, cutting almost like a fibroma. In twenty-four hours the tubes were removed. By 3rd June, when the patient went home, the tumour was about half its original size.

I again saw her on 28th June, when, except for a slight thickening under the skin in the neck, there was no evidence of there having been any growth. The naso-pharynx was clear, but a growth, the size of a plum, had formed over the sternal end of the clavicle and first rib. X-rays showed some involvement of the latter. This growth cleared up rapidly with the insertion of 60 mgms. of radium bromide.

Some six to seven weeks later she complained of pains of an indefinite nature in various parts of the body, but particularly the shoulders and right hip and thigh. There was also some enlargement at the site of the original tumour in the neck, but no recurrence in the naso-pharynx. There were also some small nodules on the right side of the neck, and two on the scalp. She was very anxious for more to be done, so radium was again used, being inserted into the growth in the neck, and placed over the growths on the scalp, with again complete disappearance. Dr Gamlen, whose radium was used, made careful skiagrams, but they did not show any tumour in the chest or lower abdomen. Dr Hall could find no implication of the nervous system, and nothing abnormal in the chest. He found a tumour about the size of an orange in the region of the gall bladder, and a small one in the right axilla. There was a secondary anaemia with leucopenia. She was known to have had a fibroid of the uterus, but this was found to be small, about the size of a tangerine, and not pressing on anything in the pelvis. It therefore could not account for the severe pain which she was now suffering in the right hip and thigh.

It appeared that deep X-ray therapy was the only thing which held out any prospect of relief, and Dr Gamlen undertook this by the Erlangen method. The tumour in the abdomen and axilla rapidly disappeared, and the pain in the hip and thigh was relieved but never disappeared. She was losing strength, and as it was obviously hopeless to attempt more, she was persuaded to go home (some seventy miles).

Her doctor told me that she rapidly lost flesh, and suffered great pain in the hip and lower part of the thigh, and had to be kept under morphia. He said that there was little doubt that there was a growth in the lower part of the femur. The

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patient died on the 14th November 1921. Although the ultimate result was bad, her life was, I think, prolonged for a short time, and she was saved from the more horrible death she would have died had nothing been done to the original growth.

## SOCIETIES' PROCEEDINGS

### ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

November 18th, 1921.

*President*—Dr A. LOGAN TURNER.

**Some Observations on the Early Diagnosis and Drainage of Otitic Meningitis, illustrated by Fourteen Cases and Specimens**—E. D. D. DAVIS, F.R.C.S.—(*Journal of Laryngology*, p. 186, April 1922.)

#### DISCUSSION.

Mr LAWSON WHALE said the difficulty lay in the drainage. He used a spiral silver wire drain instead of rubber. He now used two tubes, the total calibre of which equalled the diameter required, so that if one should become blocked the other would probably still act. They were sewn together, side to side, so that on section they looked like the figure 8.

Mr G. J. JENKINS wished to emphasise his disapproval of repeated lumbar punctures or the taking away of much fluid in cases in which the diagnosis of meningitis of labyrinthine origin had been made; he thought it dangerous, as a means of diffusing infection through the posterior fossa. He did not agree that if the fluid appeared to be clear, the case should be regarded as one which could be treated by simple mastoid operation. There were other certain clinical signs of importance. The fluid should be examined at once and a report given before the operative procedure was carried further. If polymorphs were found, it indicated meningitis.

**Remarks on the Comparative Effects, immediate and remote, of introducing Absolute Alcohol into the Labyrinth of Birds and Human Subjects (Cinematograph Demonstration)**—SYDNEY SCOTT, M.S.—Mr Scott described some investigations on the labyrinth of pigeons, which he had carried out a little more than two years ago.

Only by the total absence of reactions could it be inferred that the labyrinths had been destroyed, or were functionless. He had destroyed the labyrinth by means of absolute alcohol, five years ago, in a patient who had had an ordinary fistula of the external semicircular canal, caused by otitis media. A radical mastoid operation had been

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performed two years before he first saw the patient—a young woman—who was subject to persistent recurrent vertigo. He found that her labyrinth reactions were normal, and that pressure upon a spot in the region of the external semicircular canal, lightly applied with a probe, produced the usual phenomena associated with a bony fistula or sinus of the canal.

After the injection of absolute alcohol through the “fistula” into the semicircular canal, the patient had immediately presented the usual signs associated with recent destruction of the labyrinth, from the symptoms of which she had now long since recovered.

The same method had been employed in order to destroy the labyrinth of the pigeons, the alcohol being injected through the tympanic membrane and base of the columnella into the vestibule. This injection had been painlessly carried out under general anæsthesia. The evidence of defunction was the immediately altered behaviour of the birds. While human subjects recovered in a few months, so that they could run or turn, jump or dance, etc., birds exhibited very indifferent powers of adaptation to unilateral and bilateral labyrinthine loss.

A cinematograph demonstration illustrated the movements exhibited by the pigeons operated upon.

## I. ATTITUDE ASSUMED.

### *Left Labyrinth Defunct.*

Stands with head slightly or distinctly flexed to the left. When disturbed, the head rotates suddenly with the vertex down and to the left until completely inverted. At the same time the head is held near the ground, and the bird generally moves backwards in short, quick steps, circus-wise, to the left.

### *Both Labyrinths Defunct.*

Stands with feet wide apart and head hyper-extended, with beak pointing directly upwards. Suddenly the head may be flexed forwards until the beak meets the ground, and then, as suddenly, the head is elevated and flexed backwards until the beak rests on the bird's back. These “see-saw” movements were more obvious at first than after some months, but they were observable at the ninth month; that was the full period of survival.

## 2. BEHAVIOUR IN CAGE.

Never leaves floor of cage or attempts to hop on to perch which was 18 ins. high, but after twelve months was generally found on a new perch which had been but only 6 ins. from floor of cage.

Quite soon was able to fly on to perch 18 in. high, though it exhibited difficulty in balancing in antero-posterior plane.

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## 3. FLIGHT.

Generally avoided, even when released, but on the few occasions the bird rose and swept to the left, descending quickly in a spiral, resembling a rapid spinning nose dive.

Never flew more than a few yards, and always overbalanced forwards on landing.

## 4. FEEDING.

For several months the birds were hand fed, but then had gradually become independent and fed themselves.

### *Left Labyrinth Defunct.*

Tends to peck at grain sideways with beak horizontal, pecking towards the right.

### *Both Labyrinths Defunct.*

Misses the grain by always pecking about half an inch in front of each grain of corn, when separately scattered. It was necessary to keep a supply in a vessel full of grain.

## 5. EFFECT OF OBSCURING VISION BY COVERING ONE OR BOTH EYES WITH A HOOD.

### *(a) Both Eyes Covered.*

#### *Left Labyrinth Defunct.*

Stands still, head low, left eye down; walks cautiously circus-wise, turning to the left when repeatedly touched.

#### *Both Labyrinths Defunct.*

Remains motionless in whatever position it is placed for an indefinite time. For instance, will remain on back, or on side with head doubled up beneath body. Will stand on feet with beak touching ground, and may then, on being touched, suddenly elevate beak and hyper-extend (backwardly flex) neck till vertex rests on the back and tail touches ground.

### *(b) Right Eye only Covered.*

Walks slowly circus-wise to the left. When held off the ground in the hand, both wings being free to move, the right wing flaps strongly, making complete excursions of  $180^\circ$ , whereas the left wing moves feebly through only about  $90^\circ$ .

Stands with feet wide spread, beak pointing skywards. Rotates on vertical axis to the left, that is, to the visual field.

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## (c) *Left Eye only Covered.*

Stands with right eye turned upwards; feet wide apart, right leg abducted, and weight of body on left leg. Rotates faster and faster to the left.

Again stands with feet wide spread and beak pointing skywards. Rotates faster and faster when touched, as if pivoting on vertical axis of beak, turning to the right, that is, to the visual field.

It was not intended to draw deductions too closely from these observations in relation to aviation problems. The demonstration merely showed that absolute alcohol produced certain definite effects which, it was inferred, were the result of destruction of the otic labyrinth as a whole, and that in the case of birds the power of adaptation to labyrinth loss was very inferior to that possessed by human beings.

Dr URBAN PRITCHARD said Dr Gray had confirmed microscopically what he (Dr Pritchard) had shown microscopically, that birds had an enormous area of nerve cells, and the cilia had the curiously wavy contour which was seen particularly on the crista of the semicircular canal. Hence it would be understood that when this was destroyed, birds were much more at a loss than were human beings who had a similar loss.

Mr G. J. JENKINS said that in some cases the human being did not completely recover control if both labyrinths had been destroyed. He had shown that day a man—obviously of low intelligence—who had had both labyrinths destroyed ten years ago, and he had not yet re-established control. Lately he had operated upon a case of meningitis, and the patient seemed likely to recover. He had already operated, last June, on the same man for meningitis infected from the other ear. He had now lost the function of both labyrinths, and it would be interesting for members to see him a short time before re-education methods had begun, and again six months afterwards.

**The Course and Relations of Arnold's Nerve (Auricular Branch of the Vagus) in the Temporal Bone**—ALBERT A. GRAY, M.D. (*Journal of Laryngology*, April 1922, p. 182).

Mr G. J. JENKINS knew from experience how difficult it was to follow out small nerves in such structures as were concerned here. He had seen it stated that Arnold's nerve did come out by a separate foramen in some cases. But he wondered whether Dr Gray had considered the application of his findings to the segmentation of the skull.

Mr J. F. O'MALLEY asked as to the course of the auricular branch of the vagus; it seemed to take a downward and then an upward direction, and the chorda tympani the same route. Did Dr Gray attribute that to developmental changes in the mastoid process?

Dr GRAY (in reply) said he was not versed in the subject of segmentation in cranial nerves. In answer to Mr O'Malley, he thought the change

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in position or course of the nerves described was due to the development of the mastoid process. In sheep and rabbits the stapedius muscle lay above the facial nerve. That was why the chorda tympani took its reversed turn.

## THE SCOTTISH OTOLOGICAL AND LARYNGOLOGICAL SOCIETY.

FOURTEENTH MEETING, VICTORIA INFIRMARY, GLASGOW.

December 10th, 1921.

*President.*—Dr HENRY PETERKIN.

**On Dental (Root) Cysts and Cysts of the Floor of the Nose, illustrated by Lantern Slides**—Dr A. BROWN KELLY.—(The paper will appear *in extenso* in the *Journal of Laryngology*.)

Dr Brown Kelly drew attention to the confusion in nomenclature which had arisen from the failure to recognise that the conditions described as “hydrops antri”—distension of the maxillary sinus—and closed empyema of the antrum did not exist as such, but were really produced by dental cysts invading the antrum. The larger cysts were removed by dissection, the smaller could be cured by scraping. Cysts of the anterior part of the floor of the nose were retention cysts developing from long ducts in that situation, and they had no genetic connection with the teeth. If small, they were cured by puncture and cautery, or if larger, by sublabial dissection.

Dr LOGAN TURNER remarked that Dr Kelly had clearly proved his case, that the so-called hydrops antri was really an invasion of the sinus cavity by a dental cyst. Of five cases of cyst of the floor of the nose which he (the speaker) had seen, all were women; one case was bilateral.

Dr D. WATSON drew attention to one of the specimens in which the cyst appeared to arise from the fang of an undeveloped and probably healthy wisdom tooth. As dental cysts are caused by infection at the tooth root, might not the specimen be a radicular odontoma?

Dr DOUGLAS GUTHRIE asked whether the tooth connected with the cyst was always carious, as in a specimen of his own, none of the teeth on the side of the cyst were so.

Dr GAVIN YOUNG asked if a return of cystic fluid on proof puncture of the antrum was an indication for exploring through the canine fossa.

Dr BROWN KELLY (in reply) emphasised the distinction between dental root cysts and dentigerous cysts. The former implied an origin from a septic tooth, but this may have been previously extracted, or the cyst may be found extending above a healthy tooth, or it may exist in an edentulous jaw.



# Otological and Laryngological Society

## **The Influence of Toxic Agents upon the Nasal Mucosa—**

Dr NEIL MACLAY.—(*Journal of Laryngology*, April 1922, p. 176.)

Dr ADAM agreed that a general poisoning might account for many nasal troubles, and he cited cases of catarrhal rhinitis and hay fever in which milk was a toxic factor in inducing and prolonging the nasal symptoms. He regarded the catarrhal condition of the nasal mucosa in asthma as produced by errors in dietary, usually too much carbohydrate. Many men, victims of asthma in civil life were cured while in the army, due, he believed, to the strenuous open-air life and a not too generous diet.

Dr SYME thought that a very careful examination should be made of the nose and accessory sinuses before accepting Dr Maclay's suggestion. Asthma was a toxic condition often associated with antral mischief, even in children, and the antrum should be thoroughly investigated.

Dr HARPER considered that in asthma we had to deal with three conditions, local nasal, nervous and gastric; one may predominate, but all three required treatment.

Dr J. S. FRASER thought that in every case, before operating, we should try to eliminate the possibility of food intoxication or animal asthma.

Dr BROWN KELLY said that the vasomotor factor played a part in causing and maintaining the nasal symptoms in many patients. There were cases in which turbinotomy should not be done, but the cause of the intermittent obstruction should be sought for and corrected. In a number of these cases he had not found the protein tests useful.

Dr MACLAY (in reply) said that his main object was to direct the rhinologist's attention to an aspect other than the purely local nasal phenomena. So many nasal operations were done, and the results were often disappointing. The possibility of underlying general toxic conditions should be inquired into.

## **Nævus appearing in the Mouth, Pharynx and Larynx—**

Dr A. BROWN KELLY.—Male, aged 25, with extensive nævus of skin of right side of neck and face and crossing to the left side. He suffered from right-sided epistaxis, and on examination it was found that the nævus involved right half of tongue, right tonsillar region, epiglottis, hyo-epiglottic ligament, pyriform sinus, arytenoid and ventricular band with a few patches of redness in front of left arytenoid.

## **A Series of Cases of Middle Ear Suppuration in Children (Tubercular?)—**

Drs J. W. LEITCH, G. B. BRAND and J. ADAM.—The children were 3, 10, 12, and 23 months old. Baby D., aged 3 months, had the typical clinical appearance of tubercular middle ear disease; enlarged glands (four weeks), ear discharge (two weeks), facial paralysis (one week); mastoid carious; erosion of facial canal; destruction of ossicles. The three other cases did not present a typical tubercular picture.

Dr KERR LOVE stated that he saw a good many cases of tubercular ear disease in children from the ages of 1 to 3, but he never saw it in school children. A good many die of meningitis.

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**Two Cases of Chronic Middle Ear Suppuration with Associated Disease of the Central Nervous System.**—Dr J. ADAM.

(a) ? Pachymeningitis Hæmorrhagica. Male, aged 34, admitted with giddiness for one month; occipital headache, two weeks; difficulty in speech, one week. No vomiting. Wassermann negative. Paresis right face and right side of tongue; feeble right grip; partial motor aphasia; alert, but difficulty in utterance. Discs normal. Left ear, pus and polypus. Conversational voice at  $2\frac{1}{2}$  feet with noise box in right ear. Radical operation: pus and granulations in middle ear. After operation, caloric syringing gave violent nystagmus. Aphasia became worse. One month after operation paralysis began to disappear, and the aphasia cleared up and the ear healed.

(b) Female, aged 37, with bilateral chronic middle ear suppuration and disseminated sclerosis. When first seen she had giddiness and tinnitus, but spontaneous nystagmus was present on deviating the eyes to both sides, also on looking upwards and downwards. The rotation and caloric responses were normal. Later, the typical manifestations of disseminated sclerosis developed.

**Bilateral Congenital Bony Stenosis of Choanæ**—Dr W. S. SYME.—Boy, aged 8. On both sides the obstruction was bony: on the left it was smooth, on the right side it was pitted in the centre. The obstructing bone was removed with chisel and forceps and the posterior third of the septum resected. Packing has been continued for two weeks.

Dr GUTHRIE said he had seen Professor Bourgeois treat such a case with diathermy. The scar had little tendency to contraction.

Dr J. S. FRASER had operated upon three unilateral cases. A good functional result he ascribed to making a large hole in the posterior part of the nasal septum.

Dr SYME (in reply) wondered whether, in his case, patency would remain. With the forefinger in the naso-pharynx, he could feel that the contraction was strong and firm.

**Suspension Laryngoscopy. A Review of a Series of 102 Cases.**—Dr J. CAMPBELL MACGREGOR.

Dr Macgregor reviewed the series of cases which had occurred in the service of Dr Syme. In the majority of the cases the examination was made under local anæsthesia after preliminary injection of omnopon. In only two cases did the method fail to give a satisfactory examination, the failure in one case being due to the fact that there was not a sufficiently long epiglottis tilt. The main difficulty encountered was the absence of teeth, thus preventing the gag from getting a firm hold on the jaw. If one or two badly placed teeth existed in the upper jaw, the difficulty was increased. Both for examination and operation purposes the method was regarded as very valuable, especially when dealing with conditions of the larynx affecting the anterior commissure.

# Otological and Laryngological Society

**Cases of Nasal Lupus treated with Acid Nitrate of Mercury**—Dr JOHN L. HOWIE.—The treatment consisted in applying upon a cotton-tipped probe the liquid acid nitrate of mercury, after cocainising the affected area. In a week or two any remaining points of disease are touched. The results were more satisfactory than those obtained by any other method which he had tried.

**Cases of Ozæna treated with Glucose**—Dr JOHN L. HOWIE.—A twenty-five per cent. solution of glucose in glycerine was applied three or four times daily on a cotton-wool swab. The results were gratifying.

**Chronic Œdema of the Face, associated with Nasal Accessory Sinus Disease**—Dr KEITH ROBERTSON.

(1) Female, aged 18, in September 1920, had swelling of the external nose and upper lip. She had nasal polypi and suppuration in the antra, ethmoidal cells and sphenoidal sinus. After treatment in 1920 she remained very well, and the swelling almost entirely disappeared.

(2) Male, aged 21, in January 1921, had swelling of bridge of nose, beneath both eyes and over the cheeks. Ethmoidal and sphenoidal sinuses opened and drained. There is still slight swelling of face.

Amongst a number of interesting exhibits—

Dr BARRIE BROWNLIE showed **An Unerrupted Tooth found in an Abscess of the Nasal Septum**, which had been caused by a suppurating dentigerous cyst extending upwards under the perichondrium. It was removed from a male, aged 56, who, for three years, had a recurrent swelling of the gum over the left lateral upper incisor. Nasal examination showed the usual appearances of septal abscess. On opening the abscess of the septum, the tooth was found lying loose between the mucous membrane flaps. A communication existed between the abscess cavity and the cavity in the jaw bone. The tooth was a supernumerary unerupted incisor.

Dr J. ADAM showed the specimen of a case of **Cancer of the Right Pyriform Sinus of fifteen years' duration**.—Female, aged 53 at her death, was first shown to the Society in 1913, as a case cured by repeated doses of radium. The growth seemed to disappear for months at a time after treatment. She ultimately required gastrostomy and tracheotomy. The *post-mortem* in 1921 showed healed stenosis and ulceration of the œsophagus for a distance of 1¼ inches, beginning at the upper level of the thyroid cartilage; thickening of cricoid; involvement of right half of larynx, extending below the vocal cord; involvement of thyroid gland and of lymphatic glands in neighbourhood. No metastases in liver, lungs, or mediastinal glands. The microscope revealed the tumour in parts definitely epitheliomatous, in parts spheroidal with a variable amount of fibrous tissue, while in other areas the growth was of a glandular type.

## ABSTRACTS

### NOSE AND ACCESSORY SINUSES

*A Simple Bloodless and Painless Operation for the Complete Exenteration of the Ethmoid Labyrinth.* Dr HAROLD HAYS. (*Laryngoscope*, Vol. xxxi., p. 186.)

Under local anaesthesia induced by cocaine infiltration directly into the ethmoid cells, Dr Hays makes an incision above the middle turbinal. He applies a chisel to the anterior end of the incision, and drives it backward till it touches the sphenoidal wall. The mass is pushed downward and snared. There is no pain, no bleeding, and the author has used this method in over 100 cases.

ANDREW CAMPBELL.

*The Relation of Naso-pharyngeal Malignancy to other Diagnoses.*  
G. B. WEIR. (*Collected Papers of Mayo Clinic*, 1920.)

The lack of nasal symptoms in malignant disease of the naso-pharynx is surprising, and even if a routine examination is made, a small growth in this region may escape observation. At the Mayo Clinic, during the past four years, forty-six cases have been studied. In only twenty-four of these were nasal symptoms present; nasal obstruction in nineteen cases, recurrent bleeding in three cases, nasal discharge in two cases. Eye symptoms (diplopia, dim vision, ptosis, etc.), were noted in ten cases. Eleven of the patients complained of earache, and seventeen suffered from headache, or pain in the neck and jaw. Enlarged cervical glands were present in thirty-two of the patients, eleven of whom had undergone operation for removal of the glands, without the primary focus being found. Six had nasal operations, apparently without discovery of the malignant growth. One patient underwent operation for pituitary tumour, which was found at necropsy to be a direct extension into the sella turcica of an epithelioma of the naso-pharynx. Several cases are reported in detail.

DOUGLAS GUTHRIE.

*The Deviated Septum and its Correction in Young Children.* G. J. ALEXANDER. (*Journ. of Ophth., Otol. and Laryngol.*, Sept. 1921.)

Alexander affirms that developmental deformities of the nasal septum generally make their appearance a year or two before the second dentition, despite St Clair Thomson's statement to the contrary.

When catarrh, alar collapse, mouth breathing, high arched palate and irregular dentition depend upon intra-nasal obstruction, mere removal of adenoids is not enough. Alexander believes that sub-

# Nose and Accessory Sinuses

mucous resection is the best operation, as in adults; he therefore practices it under general anæsthesia, contriving to overcome the technical difficulties.

Whilst denying that the delicate septum has any effect upon the development of the massive osseous walls of the nose, he is careful to leave adequate cartilaginous support anteriorly. In a number of cases observed over a period of five years, the results have been excellent, and in no instance has the growth of the nose been impaired

WM. OLIVER LODGE.

*Malignant Granuloma of the Nose.* Sir ROBERT WOODS.

(*Brit. Med. Journ.*, 16th July 1921.)

Two cases are described presenting a spreading ulceration of the nasal passages with destruction of the septal cartilage and the formation of fetid glutinous crusts. In both cases the Wassermann reaction was repeatedly negative and anti-syphilitic remedies failed. The condition extended in both cases to the soft palate with perforation. In the second case necrosis of the superior maxilla occurred, while in the first the nasal bridge became depressed. The first case had no pain, but the second required anodynes, and had to move about very cautiously to avoid jarring. Specimens removed for examination showed granulation tissue to be the dominant feature, but in one place at least (in case 1) it had developed into something very like a sarcoma. X-ray treatment of the first case failed, and the patient died after  $4\frac{1}{2}$  years, but radium treatment of the second case gave an excellent result. There was a slight recurrence after six months, but that yielded to a further exposure.

T. RITCHIE RODGER.

*A Case of Acute Frontal Sinus Suppuration followed by Multiple Frontal Lobe Abscesses.* R. GRAHAM BROWN. (*Medical Journal of Australia*, 15th October 1921, Vol. ii., p. 313.)

The patient, a man aged 24 years, displayed well-marked signs and symptoms of left sided acute frontal Sinus disease.

Partial middle turbinectomies, and intra-nasal enlargement of fronto-nasal ducts on both sides. Three days later the patient's condition was much worse. A radical operation—removal of the floor and contents of frontal sinus—was performed. 10 c.c. of pus under pressure escaped. Excellent view of posterior and anterior walls was obtained. No necrotic area on posterior wall was seen. Two days later, slight blurring of right optic disc and patient became drowsy. Two weeks later he complained for the first time of pain in the head and vomited. Condition fluctuated; was allowed out of bed. Twenty-fifth day after first operation, sudden onset of right-sided hemiparesis. Seven weeks after first operation, definite signs

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of intra-cranial pressure. X-ray operator advised that there were signs of multiple abscesses of frontal lobe.

When trephined over frontal region—45 c.c. of greenish yellow pus escaped after incising the dura and brain substance to a depth of 1.2 cm. to 3 cm. Patient died suddenly three months after first operation. *Post mortem*. Three abscess cavities were found bounded by thick tough capsules which suggest that the abscesses were present when the patient was first seen.

A. J. BRADY.

### *Cause of Failure of the Radical Operation on the Frontal Sinus.*

THOS. J. HARRIS, M.D., New York. (*Journ. Amer. Med. Assoc.*, Vol. lxxvii., No. 15, 8th October 1921.)

This is a review of the various external operations for the cure of chronic frontal sinus disease, and a consideration of the failure that so often ensues. Following Killian's publication of his external operation, specialists thought they had at last reached a method by which a cure would always follow, but Harris says a wave of disappointment at the operative results seems to have taken place. Inability to relieve pain and discharge signifies failure.

Lothrop's operation is very favourably considered. It differs in principle from the other external operation in that obliteration of the sinus is not sought but rather restoration of function by removal of diseased tissue and the establishment of thorough and permanent drainage. Intra-nasal and most external operations are followed by narrowing of the communication between the nose and the frontal sinus which is so often the cause of persistent suppuration above. In Lothrop's operation the other frontal sinus is opened and a portion of the bony wall of the septum is removed. He states that an operation involving removal of the lower wall defeats any attempt to get satisfactory drainage, and he does not hesitate to remove the floor of both sinuses so as to get as large an opening as nature will allow. It is essential to remove part of the base of the nasal bones and adjacent bone, and the upper part of the septum.

PERRY GOLDSMITH.

### *The Management of Chronic Frontal Sinusitis with External Manifestations.* HAROLD I. LITTLE. (*Surgical Clinics of North America*, p. 1381, October 1921.)

This paper gives some details of 22 cases treated at the Mayo Clinic. Fistula was present in 16, subperiosteal abscess in 5, and mucocele in 1.

In three cases an intranasal operation proved sufficient, but in the remainder this was followed, a week or ten days later, by external operation. The two-stage method of operating presents many

# Pharynx

advantages. The external incision should be just above or just below the eyebrow, so as to minimise scarring. Free removal of bone is essential, so as to avoid abrupt edges and to eliminate pockets. Enlargement of the fronto-nasal duct is readily accomplished because of the previous intranasal operation.

The wound is entirely closed and little post-operative treatment is required. Lavage is seldom necessary. The paper is beautifully illustrated.

DOUGLAS GUTHRIE.

*Indications for Pernasal Opening of the Frontal Sinus.* Dr LOUIS VAN DEN WILDENBERG, Louvain. (*Bulletin d'Oto-Rhino-Laryngologie*, November 1921.)

The author strongly advocates the pernasal route for most operations on the frontal sinus. He is able to remove the whole floor of a small sinus, and a large part of that of a large one, by this method, and inspects the sinus. He insists on the value of a skiagram before operation. The sinus may be explored by this route if there is reason to suspect it, even in the absence of definite confirmation. He uses the method for both acute and chronic cases, and has recorded several cases even with external fistulæ, cured by endo-nasal drainage. The method is safer than the external [presumably in the hands of one well accustomed to endo-nasal operations—E. W. W.] The writer's results give at least as large a percentage of cure and relief as the external operation: one can resort to the latter later if it seems necessary.

E. WATSON-WILLIAMS.

## PHARYNX.

*The Question of the Physiological Significance of the Tonsils.* FLEISCHMANN, OTTO, Frankfort-on-Main. (*Archiv. für Laryngol.*, Band xxxiv., Heft 1, 1921, p. 30.)

The author considers the tonsils to be internal secreting glands, chiefly on account of their sap containing a reducing agent revealed by its chemical reaction on a solution of gold sodium chloride. It gives rise to the red tint characteristic of colloidal gold solution (as prepared by Faraday, J. D. G.). This reaction can be obtained from normal tonsils and from those which are the subjects of simple enlargements or chronic inflammatory swelling, but not from acutely inflamed tonsils. There seems reason to suppose that the reducing agents in the saliva, at all events parotid saliva, are acquired from the tonsils. This reducing action is characteristic of the supra-renal capsules and the other chromaffin structures, which act as sympathetic

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stimulants. The tonsils are credited with protective action, whether through their carrying off the pathogenetic bacteria or destroying them by phagocytosis.

JAMES DUNDAS-GRANT.

*Further Contributions to the Physiology and Pathology of the Tonsils and Nose.* FLEISCHMANN, OTTO, Frankfort-on-Main. (*Archiv. für Laryngol.*, Band xxxiv., Heft 2 and 3, 1921, p. 265.)

Fleischmann considers that there must be other protective agencies in the mouth which are not contained in the tonsils. The reducing material of the tonsils in itself takes no share in the natural bacterial protection of the mouth, because we see that in acute tonsillitis the reducing agent disappears, just when it is most required. "Such an inconsequence on the part of Nature is unthinkable." Fleischmann then poses the difficult question as to whether perhaps the protection of the mouth against bacteria may depend on a process of oxidation, for which the "reducing" agent supplies simply material for oxidation.

JAMES DUNDAS-GRANT.

*On the Tonsil-question.* FEIN, JOHANN, Vienna. (*Archiv. für Laryngol.*, Band xxxiv., Heft 2 and 3, 1921, p. 319.)

Fein expresses gratitude to Fleischmann for the trouble he has taken to throw light, by means of his investigation, on the puzzling relations of the pharyngeal lymphatic ring and to bring somewhat nearer the question of the function of the tonsils. At the same time he considers the problem still unsolved as to whether the secretion of the tonsils, containing, as it does, a reducing material, is so given off into the blood as to entitle the tonsils to be stamped as endocrine glands. This question he recommends for study at the hands of the biologists.

JAMES DUNDAS-GRANT.

*Examination of the Blood in Inflammatory Conditions of the Pharynx and Upper Air-passages.* V. SCHMIDT. (*Acta Oto-laryngologica*, Vol. iii., fasc. 1 and 2.)

The author's observations were made on cases of acute and chronic tonsillitis, peritonsillar abscess, diphtheria, acute and chronic rhinitis and pharyngitis, acute tracheitis, pyorrhea alveolaris and scarlatinal angina. He holds that blood examination, particularly with reference to polynuclear leucocytosis, supplies valuable information as to the intensity, increase, and decrease of the disease. Leucocytosis is the first objective sign of infection, as it may be detected in many cases several hours before the rise of temperature or increase of pulse rate. In some cases the leucocytosis persists after the disappearance of the local symptoms and even of the pyrexia and high pulse rate; it is thus an indication of the persistence of



# Pharynx

the toxins in the blood and shows that the disease is not yet terminated. Such a persistent leucocytosis continuing after the pyrexia has ceased affords in many cases extremely important evidence of scarlatina at a time when the rash has disappeared, and the desquamation has not yet disclosed the fact that the case is one of scarlatinal angina. In ordinary angina the leucocytosis does not usually last more than a week. In diphtheria its disappearance coincides with that of the pyrexia and of the membrane.

In peritonsillar abscess the leucocytosis is considerable; often 20,000 to 30,000. After complete evacuation the leucocytosis falls rapidly.

Leucocytosis is often present in chronic tonsillitis, and also in pyorrhoea. It is absent in pharyngitis, but may be found in acute tracheitis.

THOMAS GUTHRIE.

*Blood Changes in Adenoid Patients.* D'ONOFRIO. (*Archiv. Ital. di Otol.*, xxxii., 4, 1921.)

Sixty patients with adenoids were investigated with regard to their blood picture. The examinations were made before operation, and also one month afterwards. The blood was examined in the morning in order to avoid physiological variations. The conclusions arrived at were as follows:—

One cannot establish a constant blood formula in adenoid cases because the blood varies according to the clinical type.

In the respiratory type, where obstruction to breathing is the main characteristic, there is a simple anæmia more or less severe with anisocytosis, and the leucocyte count shows a relative increase in lymphocytes and monocytes.

In the suppurative type, in which an inflammatory process spreads from the naso-pharynx to the middle ear, causing chronic middle ear suppuration, there is a polymorph leucocytosis as well as diminution of the reds.

In a third type the blood is very little altered. These are patients over twenty years of age in which the adenoids have caused merely chronic catarrh.

Removal of the adenoids always improves the blood condition.

J. K. MILNE DICKIE.

*The Oral Cavity in Relation to Pain.* H. MARX. (*Munch. Med. Wochenschrift*, Nr. 42, Jahr. 68.)

Tests carried out with a mounted needle in a number of patients gave the following clinically and scientifically important results. There is always present in the mucous membrane of the cheeks a definite analgesic zone as first pointed out by Kiesow. Besides

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this many people are found to have more or less extensive, strongly hypalgæsic or completely analgesic zones in the region of the palate or the tonsils. In all the cases examined the area of Kiesow was demonstrable. In 4 per cent. there was hyperalgæsia of the posterior oral regions. In all the rest there were zones of marked hypalgæsia or complete analgesia. In 30 per cent. of cases the tonsils, and in 50 per cent. the uvula, were found to be insensitive to the prick of the needle. Parts of the soft palate were found insensitive in about 30 per cent. and of the hard palate in about 70 per cent. of the cases examined.

J. B. HORGAN.

### PERORAL ENDOSCOPY.

*Dental Plate removed from the Thoracic Œsophagus by the Gastric Route.* DR EDWIN BEER. (*Trans. New York Surgical Society*, 9th March 1921.)

A male swallowed his false teeth  $2\frac{3}{4}$  years previously. When admitted to hospital in January 1921 with inability to swallow solid food and loss of weight, the tooth plate was located with the X-rays lying behind the heart, well above the diaphragm. Removal through the œsophagoscope was discarded as the hooks appeared to be embedded, trans-thoracic operation was considered hazardous, consequently laparotomy was decided upon. The hand was introduced into the stomach, and the fingers passed through the cardia, felt the foreign body, disengaged the hooks, and after rotating the plate, brought it into the stomach. The gastric mucosa at the cardiac end was torn during the procedure, but the patient made a good recovery: the gastrostomy tube was removed on the eighth day.

A. LOGAN TURNER.

*Safety-Pins in the Stomach: Peroral Gastroscopic removal without Anæsthesia.* CHEVALIER JACKSON, M.D., and WILLIAM SPENCER, M.D., Philadelphia. (*Journ. Amer. Med. Assoc.*, Vol. lxxvi., No. 9, 26th February 1921.)

Foreign bodies that have reached the stomach spontaneously will usually pass the pylorus. The exceptions are in cases with an abnormally small pylorus, or a foreign body of unusual size or character. Most cases occur in infants or very young children in whom it is not always certain that the pylorus is normal in size. It is the custom in the authors' Bronchoscopic Clinic not to interfere with foreign bodies in the stomach until after a month or two of fluoroscopic watching. This procedure has almost invariably been justified, in that even safety-pins have usually been passed by the natural passage within three days.

Two exceptions are recorded, one after a sojourn of twenty-seven

## Peroral Endoscopy

days; two safety-pins were removed from the stomach of a six-month-old infant by gastroscopy without anæsthesia. The pins were linked together, and it required twenty-six minutes to get them turned, so that one of them would present the keeper end for traction. The second case, age twelve months, was one in which an open safety-pin lay in the stomach for several weeks; it was then regurgitated into the esophagus and removed by esophagoscopy. PERRY GOLDSMITH.

*Are there Cases of Foreign Body in the Lung impossible of Bronchoscopic Removal?* Dr CHEVALIER JACKSON. (*Laryngoscope*, Vol. xxxi., No. 7, p. 528.)

In the opinion of the author there are no fixed limitations to the peroral bronchoscopic removal of foreign bodies that have gone down into the lungs through the natural passages. More than one attempt may be necessary. In non-opaque bodies which cannot be localised, the question is different, but if of appreciable size they can be located by the X-ray, and always by the physical signs. ("Diagnosis and Localisation of Non-opaque Foreign Bodies in the Bronchi," *Amer. Journ. Roent.*, Vol. vii., No. 6, p. 277, June 1920.)

If a foreign body of appreciable size seems to be beyond bronchoscopy, one of the following four things will happen, if the patient survive: (1) The mechanical problem will be worked out, or (2) a temporarily unreachable foreign body will be reached, or (3) the foreign body will shift to a more favourable position, or (4) the foreign body will be loosened by suppuration—thus the limitations of anything mechanical are only temporary. Some time ago Dr Jackson published five failures, but since then, parallel and identical cases have been successfully bronchoscoped. A few such parallels are described. The two following cases illustrate the advance in bronchoscopy. A child of 2 years aspirated a needle; after failures elsewhere Dr Jackson removed the needle in five minutes without anæsthesia, local or general, from a small posterior branch of the inferior lobe bronchus. "The invaded bronchus was so small that only the smallest of the author's mosquito forceps could be insinuated into it." The buried point was seized and the needle withdrawn. The second case is of a boy 8 years who, when 2½ years old, spat up a mouthful of blood. Since then the chest condition had been treated at various times as purulent bronchitis, bronchiectasis, and tuberculosis. An X-ray revealed a foreign body very low in the base of the right lung. Bronchoscopy without anæsthesia, local or general. "Small fistulæ leading off laterally away from the direction of the foreign body. Connective tissue removed with biting forceps." The wound was dilated, foreign body seized and removed. Pus very foul after connective tissue barrier was removed. Time eleven minutes forty-eight seconds.

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During six years' sojourn the foreign body had worked its way from the orifice of the main bronchus to the bottom of the lung. In some of these cases the X-ray screen was invaluable. Since this article was written the author removed under local anæsthesia, a bullet that had entered between the seventh and eighth ribs posteriorly and lodged in lung tissue, not in a bronchus.

Bronchoscopy looks dangerously easy when one watches Dr Jackson at work, but one must remember the years of patient work and research before these results were possible. "Concentrated work with rubber manikins, dog, or cadaver will eventually solve any problem of bronchoscopic removal."

ANDREW CAMPBELL.

*Endoscopic Removal of Sand Spurs from Larynx and Tracheo-bronchial Tree.* H. MARSHALL TAYLOR, M.D., Jacksonville, Flo. (*Journ. Amer. Med. Assoc.*, Vol. lxxvii, No. 9, 27th August 1921.)

A species of the grass family called *Cenchrus tribuloides* is widely distributed on the North American Continent. In Florida it is known as the sand spur. The spurs are very sharp and cling to anything with which they come in contact. A series of 19 cases is recorded in which they acted as a foreign body in the air passages, though in Jackson's analysis of 882 foreign bodies no mention is made of sand spurs. The flora of Florida, where this grass is most abundant and is indigenous, is therefore a definite etiological factor in foreign bodies in the air passages.

In 18 cases in the author's practice, 16 of the spurs were found to be located at some point in the larynx, generally the anterior commissure. Two were in the right bronchus. A history of inspiring the foreign body with aphonia and pain on swallowing occurred in all cases. Eight complained of pain referred to both ears. When the spur had been in the larynx for more than twenty-four hours, a dirty greyish exudate developed resembling somewhat laryngeal diphtheria. A mild toxæmia was also present.

A fatal case of pulmonary abscess following inhalation of one of these spurs is recorded.

PERRY GOLDSMITH.

### LOCAL ANÆSTHESIA.

*Anæsthesia in Nose and Throat Work.* (*Journ. Amer. Med. Assoc.*, Vol. lxxvii, No. 17, 22nd October 1921.)

A Committee was appointed by the American Medical Association under the chairmanship of Dr Emil Mayer, to determine the number of fatalities following local anæsthesia in nose and throat surgery.

Of the 22 deaths reported 11 were from cocaine (in three a nurse's error), one from procaine and cocaine, one from procaine only, and one from alypin and cocaine. All these fatalities have

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occurred within the last two or three years, and with the exception of three, none have been reported. The amount of epinephrin used was carefully investigated, and was not considered a factor in any case.

In a previous report (*Journ. Amer. Med. Assoc.*, No. 75, 315, 31st July 1920), 21 deaths were recorded, 15 from cocaine and 6 from procaine.

The report considers that there are many more fatalities occurring among general surgeons, the specialists, and also amongst dentists.

The following conclusions are recorded :—

(1) Deaths from the administration of local anæsthetics are vastly in excess of the number reported in the medical journals.

(2) In most instances convulsions are the first indication of toxic effects: consciousness is never regained, and death ensues within a comparatively short time.

(3) The customary dosage of local anæsthetics varies from small amounts to very large ones.

(4) There is no check on the manufacturer as to the comparative toxicity of the various batches of drugs that are placed on the market.

(5) The freedom from all effects noticed by so many who have used these drugs has made them oblivious to the likelihood of danger.

(6) The presumption of the Therapeutic Research Committee of the Council on Pharmacy and Chemistry of the American Medical Association, that there are many unrecorded deaths, is thoroughly substantiated.

(7) The appointment of a commission to investigate further these deaths and to take action thereon is vitally necessary.

PERRY GOLDSMITH.

## REVIEWS OF BOOKS

*Traité des Affections de l'Oreille.* M. LERMOYEZ, N. BOULAY, and A. HAUTANT. Royal 8vo, 1000 pages. Published by G. Doin. Paris, 1921.

This is the first of two volumes dealing with diseases of the ear. It includes the methods of examination, generalities of technique, and therapeutics and affections of the Middle and External Ear. Diseases of the Internal Ear and Oto-sclerosis are not included in this volume.

The character of the book is similar to that of most first-class French scientific books in the following respects. It is well printed and illustrated, very well written, wretchedly bound, and very badly indexed. The style, which is best described as "racy," compels and retains the interest of the reader. Classification and Sub-classification

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are carried out to a degree which, at first, is somewhat confusing, but undoubtedly helps accuracy of thought and expression.

One is impressed by the impartiality with which all views are weighed and discussed, and the judiciousness with which they are accepted or refuted. For instance, 30 pages are devoted to the after-treatment of the Radical Mastoid wound. Gauze-packing is contrasted with the boracic powder method. The latter method consists in daily filling up the mastoid wound (after removing the initial gauze-packing on the fifth day) with sterilised boracic powder. Again, the technique of Heath's modified radical mastoid operation is described. The indications and contra-indications are analysed. The conclusions at which the authors finally arrive are that "We do not consider that the conservative mastoid operation will occupy an important position in the treatment of otorrhœa, or become a classical intermediary step between conservative measures and the complete operation."

One of the most interesting sections of the book is that referring to operations on the mastoid. The position of the antrum, as Cheatle has pointed out before, is given considerably above the traditional situation. They state that in 45 per cent. of cases the floor of the antrum is situated above a line drawn horizontally backwards from the supero-posterior margin of the auditory meatus. The actual steps of the operation, both acute and chronic, are exceedingly well described with the assistance of some excellent illustrations. Particularly one might mention the directions given for the final levelling of the posterior meatal wall and the facial spur. Incidentally, no mention is made of the Hugh Jones line. On the whole, the methods employed are much the same as in this country. There are, however, a few exceptions. For instance, it is urged that the plug inserted into the sulcus lateralis to arrest hæmorrhage should not be removed before, at the earliest, ten days, if one wishes to make certain that hæmorrhage will not recur. They counsel against immediate operation in the case of a facial paresis occurring in the course of a chronic suppurating otitis media. "To operate at once means that sometimes a temporary paresis may be rendered permanent."

The immediate closing of the acute mastoid wound is condemned. Hautant, in spite of a series of ten consecutive cases of treatment with primary suture, considers the method too risky and uncertain to be justifiable.

M. VLASTO.

*Technique Oto-Rhino-Laryngologique Semiotique et Thérapeutique.*

E. ESCAT. Troisième édition revue et augmentée. Paris:

A. Maloine et Fils, 1921.

The third edition of this well-known book presents a minutely complete account of the technique of Oto-rhino-laryngology. It is

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thoroughly up-to-date. The author not only embodies valuable conclusions derived from his recent war experience (Chef du Centre d'O.-R.-L. de la 17<sup>e</sup> région), but deals with aspects of his subject hitherto perhaps but little considered, and among these may be mentioned—medico-legal diagnosis, percentage estimation of functional disabilities, and the introduction of graphic auditory curve types.

The 770 pages afford a masterly and exhaustive account of their subject, although, in the extremely modest estimate of the author, the book remains, as in the past, a simple, elementary précis intended to serve as a guide to the student of this special subject, whether he be practitioner or specialist.

Faithful to his original design in the first edition, the author points out that he has strictly confined himself to the oto-laryngology of actual practice, leaving to bold pioneers of experimental surgery and to specialists an advance-guard surgery which may perhaps be the oto-laryngology of to-morrow, but which, insufficiently put to the test, is not yet applicable to everyday practice.

The present edition has been largely retouched and amplified, and deals with many new points—in particular, the latest refinements in ortho-laryngoscopy, hypo-pharyngoscopy, cesophagoscopy, and stereoscopic radiography. The newest methods applicable to the examination of the vestibule are discussed, and also the subject of experimental nystagmus, and the reaction movements in all their forms.

The important question of the differential signs between the labyrinthine syndrome on the one hand and the cerebellar syndrome on the other, is fully gone into. Two excellent chapters are given to the discussion of vestibular signs and symptoms.

While the section dealing with investigation and diseases of the labyrinth is in every way full and complete, it might perhaps have been hoped that more space among the seven or eight hundred pages would have been devoted to the surgery of the ear. To this subject only some eighty pages have been given, and the account has been strictly limited to the mere routine (*journalière*) surgery of that region.

Text-books must necessarily have their limitations. The book under review, with the strictly scientific nature of its conception and execution, is not only one of outstanding merit, but is one that will amply repay the effort essential to gain a knowledge of its contents, and is eminently capable of affording help on many occasions in the form of practical hints, or of suggestive and useful ideas.

ARCHER RYLAND.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W. 1.

*Section of Otology*—*President*, A. Logan Turner, M.D. *Hon. Secretaries*, Norman Patterson, F.R.C.S., and F. J. Cleminson, M.Ch. The next Meeting of the Section will be held at Leicester on Saturday, 29th April. Lunch will be served at the Wyvern Hotel at 12, noon. The Section will meet at the Infirmary at 2 o'clock. Members desiring further particulars should apply to the Senior Hon. Secretary, Norman Patterson, F.R.C.S., 16 Devonshire Place, London, W. 1, at least twelve days before the Meeting.

*Section of Laryngology*—*President*, Sir William Milligan, M.D. *Hon. Secretaries*, Walter G. Howarth, F.R.C.S., and T. B. Layton, D.S.O., M.S. The next Meeting of the Section will be held on Friday, 5th May, at 4.45 o'clock.

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BRITISH MEDICAL ASSOCIATION, GLASGOW.

The Ninetieth Annual Meeting of the British Medical Association will be held under the Presidency of Sir William Macewen, F.R.S., from the 25th to the 29th July inclusive. The Sectional Meetings are arranged for the 26th, 27th, and 28th. Laryngology and Otology have been placed in the Single Day Sections.

The following Office Bearers have been elected :—

*Section of Laryngology*—*President*, Dr John M'Intyre, Glasgow. *Vice-Presidents*, Dr A. Brown Kelly, Glasgow; Sir St Clair Thomson, London. *Hon. Secretaries*, Dr Francis Frederick Muecke, 36 Cavendish Square, London, W. 1; Dr William Smith Syme, 11 Lynedoch Crescent, Glasgow.

*Section of Otology*—*President*, Dr A. A. Gray, Glasgow. *Vice-Presidents*, Dr J. G. Connal, Glasgow; Dr W. F. Wilson, Newcastle-on-Tyne. *Hon. Secretaries*, Mr F. J. Cleminson, 32 Harley Street, London, W. 1; Mr J. W. Leitch, 6 Clairmont Gardens, Glasgow.

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TENTH INTERNATIONAL OTOLOGICAL CONGRESS, PARIS,  
19th to 22nd July 1922.

The following subjects for discussion (*Rapports*) have been arranged :—

- I. Abscess of the Cerebellum.
- II. Otitic Meningitis.
- III. The Value of Functional Tests of the Vestibular Apparatus.
- IV. Syphilis of the Ear.

The speakers will be :—M.M. Buys, Gradenigo, Hennebert, Hinojar, Jenkins, Quix, and Schmiegelow.



## General Notes

During the Congress, a Supplementary Meeting will be devoted to the discussion of the following subject:—

“The Treatment of Cancer of the Larynx by Operation  
and by X-rays and Radium.”

The speakers will be:—MM. Chevalier-Jackson, Moure, Regaud, St Clair Thomson, Sebileau, and Tapia.

The subjects for discussion will be printed and distributed before the Congress meets.

The mornings will be occupied in visiting the Departments for the treatment of Diseases of the Ear, Throat, and Nose, and for the surgery of the Head and Neck. (Operations, presentation of patients, etc.)

A collection of instruments and of anatomical and surgical specimens relating to diseases of the ear, nasal fossæ and nasopharynx, will be shown at the Faculty of Medicine during the Congress.

The Committee of Organisation are desirous of obtaining the enrolment of members of Congress, not later than 1st April. Notification must be made to Dr A. Hautant, Secrétaire Général, 28 rue Marbeuf, Paris (VIII).

Further, they desire to receive the titles of papers and communications from members of Congress as soon as possible after their enrolment.

It is necessary to send, before 1st April, a short résumé of the papers to be read at the Congress.

The subscription, which entitles members both to a copy of the *Rapports* and to the résumé of papers, is £2 sterling, and should be paid to the Treasurer, Dr George Laurens, 4 Avenue Hoche, Paris (VIII).

In order to facilitate arrangements, members are requested to state whether they intend to be accompanied by members of their family.

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The American Laryngological Society will meet, under the Presidency of Dr Harmon Smith, in Washington, D.C., on the 1st, 2nd, and 3rd May.

The American Otological Society, under the Presidency of Dr H. S. Birkett, Montreal, will meet in Washington, D.C., on the 2nd and 3rd May. *Hon. Secretary*, Dr Thomas J. Harris, 104 East 40th Street, New York.

A cordial invitation to attend the Meeting has been extended by the American Otological Society to the Section of Otology of the Royal Society of Medicine.

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The Section of Laryngology and Otology of the American Medical Association, under the Presidency of Dr Joseph A. Stucky, will meet at St Louis from the 22nd to the 26th May.

\* \* \*

The Congress of La Société Belge d'Otologie, de Rhinologie et de Laryngologie, will be held in Ghent in July 1922.

\* \* \*

The late Sir Felix Semon has bequeathed his medical library to the Royal Society of Medicine. Mr Powell, the Librarian, is preparing a catalogue of the same, and we hope to be able to inform our readers of the chief works on Laryngology which have been added to the Library by this gift.

## General Notes

Mr Charles Heath has presented, through Dr Irwin Moore, to the Section of Laryngology, for inclusion amongst the relics of the late Sir Morell Mackenzie, a fitted tray, containing a variety of laryngeal forceps for removing growths from the larynx, the forceps being designed and used by Sir Morell Mackenzie, and stamped with his name.

\* \* \*

We are indebted to Dr Perry Goldsmith, Toronto, for the two following extracts. The first, which recently appeared in the Saturday *Evening Post* (U.S.A.), is a lay criticism of a consulting-room or office :—"The real pest among reputable physicians is the young man who expects his patients to pay for his needlessly high overhead expenses. He may be known by his spacious and elaborate offices and waiting-rooms, buttoned door-boys, sleek secretaries, fluttering office nurses, and powder-monkeys of both sexes, and an all-pervading shimmer of white enamel, mechanical novelties and glittering metal work. Not infrequently the young practitioner who indulges in all these fripperies is trying to put over a poor piece by means of costly stage effects. He sometimes forgets, and his patients still oftener fail to realise, that what he really has for sale resides in his own cranium, and that mere style, atmosphere and scenery are poor substitutes for knowledge, experience, and technical proficiency."

(2) In a paper entitled *The Fads of Pseudoscience, Pertinent Queries and Musings*, by Geo. De Tarnonsky, M.D., Chicago, appears the following paragraph :—"The craze for novelty, love of the pseudomiraculous, and the fear of not finding himself 'in the procession' are prompting too many of our colleagues to discard methods of treatment which have stood the test of time for pseudoscientific measures which appeal to the imagination or inherent love of mysticism of our patients, and we, the conservatives, are called on to repair the often irreparable damage done by the faddist."

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The First Annual Ordinary General Meeting of "The Journal of Laryngology and Otology, Ltd." was held at 11 Chandos Street, London, W. 1, on Friday, 3rd March. Sir William Milligan occupied the Chair and submitted the General Report and the Balance Sheet of the Company. The latter showed that the publication of the Journal for the year 1921 had resulted in a small margin of profit. The Report was approved and Mr Herbert Tilley, Mr W. M. Mollison, Sir James Dundas-Grant, Mr W. G. Howarth with Sir William Milligan, as Chairman, were re-elected Directors.

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Binding Cases for Volume XXXVI. of the *Journal of Laryngology*, made in strong imperial morocco cloth, costing 2s. 9d. post free, are now ready and may be obtained from the Publishers on application.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## THE SACCULAR, UTRICULAR, AND ALLIED REFLEXES: RECENT RESEARCH WORK AT THE UNIVERSITY OF UTRECHT.\*

By ALEX. R. TWEEDIE, F.R.C.S., Nottingham.

MY interest in the Function of the Otoliths was stimulated by certain references quoted in an article by Bárány early in 1920 upon "The Diagnosis of Disease of the Otolith Apparatus" (*Acta-Oto-Laryngologica*, vol. ii., fasc. 4).

On application to the University of Utrecht I obtained some literature upon the subject, and at once made arrangements to visit Holland. No convenient opportunity presented itself until after the autumn vacation in 1921, when, provided with some valuable introductions, I received a most hospitable reception, both socially and professionally.

The experimental work is being carried out at the Pharmacological Institute under the direction of Professor Magnus and Dr de Kleijn, and in the Aural Clinic of Professor Quix; it is further controlled in Professor Winkler's Neurological Clinic at Utrecht, and supported by investigations under Professor Kappers and Dr Brouwer in the Institute for Brain Research in Amsterdam. While we are greatly indebted to the work of Högyes of Budapest and to the Vienna school for the original research into the function of the semicircular canals, which emphasised the kinetic factor in the auditory apparatus, it has

\* Paper read at the Meeting of the Section of Otology, Royal Society of Medicine, 18th November 1921 and 20th January 1922

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remained for workers at Utrecht to point out that the ear also possesses a static function due to the otoliths which preside over our position in space.

### **(A) Further Reflexes of the Semicircular Canals.**

I shall proceed, in the first instance, to demonstrate Further Reflexes of the Semicircular Canals, which are incidentally noted in connection with the present research.

These are known as the "progressive movement" reflexes, since they are evidenced by certain passive movements of the animal. If, for instance, a guinea-pig be placed, in its normal position, on a board, and gently moved upwards, it will be seen that at the commencement, and throughout the movement, the limbs are flexed, whilst at the termination of the movement they are extended. The reverse occurs with a downward movement. This is the "lift-reflex." Impetus may, of course, be suggested as a factor, but it can be seen with a very slow movement, and also can be shown to occur, if the animal is held vertically in one hand, with the other just supporting the feet, and the movement be made horizontally. At the same time, if one hand is gently resting on the back, definite tremor of the muscles can be felt, which constitutes the "muscle-tremor reflex." Again, if the animal is held vertically with one hand grasping it about the axillæ, and if the hind limbs are gently stroked so as to secure a flaccid condition, any slight movement vertically either upwards or downwards will induce spreading of the lower limbs and toes—"the toe-spreading reflex." Finally, if the animal be held horizontally with one hand around the neck, and the other around the loins, a forward movement will induce a forward movement of the limbs, and a backward movement the reverse—"the springing reflex."

These reflexes are absent after labyrinthectomy. They are present if the head is held immobile to the body. They are unaffected if the muscle sense is cut off by injection of novocaine, are unaffected by decerebration or the removal of the cerebellar hemispheres, and are unaffected by centrifugalisation which (as is later shown) destroys the function of the otoliths. They must, therefore, be due to the semicircular canals. (They can be demonstrated in guinea-pigs, rabbits, cats, and dogs.)

It has been stated as an objection that the semicircular canals could not react except on some rotation movement, since they form a system comparable to a closed vessel with rigid

# Saccular, Utricular, and Allied Reflexes

walls. The walls, however, are not rigid, because there is the elastic fenestrum ovale and the fenestrum rotundum. A model has also been made showing that a movement of the fluid in the semicircular canals does occur in response to motion, downwards, upwards, from side to side, or from before backwards. There are, however, some in Utrecht who still maintain that these reflexes are due to otoliths, although after the otoliths have been destroyed the reflexes still persist.

It is characteristic of the next group of reflexes that they are "tonic," *i.e.*, they persist as long as the stimulus producing them is maintained. They consist of the "neck" reflexes and the "otolith" reflexes. It is convenient to take the former first.

## (B) The Neck Reflexes.

These appear (*a*) as certain extensions or flexions of the body musculature, and (*b*) as movements of the eyeball.

(*a*) If, for example, a rabbit is laid on its back, and the head extended, it will be found that the fore limbs become rigid, whilst the hind limbs are relaxed. If the head is flexed towards the abdomen, the fore limbs become flexed and the hind limbs extended. If the head is rotated towards, *e.g.*, the right—the limbs on the right side become rigid, whilst the belly muscle of that side is relaxed, and that of the opposite rigid. (The reverse happens with rotation of the head to the left.)

These reflexes are present after ablation of the whole cranial contents down to the origin of the first, second, and third posterior cervical nerves.

(*b*) If, with the animal in its "normal" position of rest, the body is bent over the head, the eyeballs will be seen to rotate so that their upper poles move forward and downward. With the body flexed under the head the reverse action occurs. If the body is twisted around its long axis (whilst the head is held fixed) the upper poles of the eyes will move in the direction of the back (*i.e.*, that on the "back" side towards its lower lid, and that on the "belly" side towards its upper lid). If the body is bent around its dorso-vertical axis, *e.g.*, towards the right, the right eye will move into the nasal canthus, and the left eye towards its aural canthus (the reverse occurring with an opposite movement of the body).

These reflexes persist after ablation of the whole cranial contents so long as the motor oculi nuclei and corresponding nerves, their "downward" connection with the spinal cord,

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and the upper three posterior cervical nerves are intact. There is a latent period for these reflexes of from one-third to six seconds.

### (C.) The Otolithic Reflexes.

(a) *Utricular*.—The otoliths of the utricles ("the lapuli") lie more or less in one plane which is horizontal in the "normal" resting position of the animal. Each is connected with both the homolateral and contralateral side of the body musculature, except as regards the neck muscles, with which it is only associated on the homolateral side. Their action is the result of alteration of their "position" in space. They have a "minimal" and "maximal" position (the intervening positions affording varying degrees of action).

The "minimal" position is that in which the animal is in its "normal" attitude of rest, the "maximal" the reverse. For instance, in the rabbit the "minimal" position is that in which it normally sits, whilst the "maximal" position occurs when it is laid on its back, with its head at about an angle of  $45^{\circ}$  to its body. In this latter position the limbs become extended and rigid. (In order to eliminate the possibility of any "neck reflex" as shown above, the animal must be so held that no disturbance of the relation of the head to the body occurs.) If the animal is now turned back to its "normal" position the limbs become flexed.

From these and other data the majority of writers consider that the otoliths function only when they are "dependent" from the otolithic membrane.

(b) *Saccular*.—The otoliths of the saccules (the "sagittæ") do not lie in one and the same plane, but each lies somewhat below the utriculus of the same side, and in a plane at an angle of about  $45^{\circ}$  to that of the utricle on the same side. They control the "head-position" reflexes and the "compensatory eye-movements."

The "*head position*" reflex can be shown by holding a guinea-pig, for instance, by the loins in the horizontal position with the back downwards; in these circumstances the animal attempts to bring its head into the "normal" position and so retains it. In other altered positions of the body the same effect as regards the head will be induced.

The "*compensatory eye-movements*" are demonstrated also with varying positions of the animal, the head and body being maintained in their "normal" relative positions, so as to

## Saccular, Utricular, and Allied Reflexes

avoid the introduction of the element of any "neck" reflex as above described. If, with this precaution, the animal be moved from its "normal" to the vertical position with nose upwards, the eyeballs will be seen to rotate, the upper pole moving towards the nose or, if a movement of the body in an opposite direction is made, the upper poles of the eyeballs will move towards the ears. If the body is rotated around its long axis, *e.g.*, to the right, then the right eyeball will move towards the upper lid, and the left eyeball towards the lower lid; the reversed action of the eyeballs occurring with a reversed rotation of the body. (The sacculi are connected with both sides of the body.) The latent period for the otolith reflexes may be as much as twenty-three seconds.

These reflexes persist after decerebration and removal of the brain down to the level of the entrance of the eighth nerves, so long as, for the saccular effects, the motor oculi nuclei are preserved intact. They disappear after section of the eighth nerve, after labyrinthectomy or after "effective centrifugalisation." (For the convenient detection of the movements of the eyeball a "cross" should be gently branded on the cornea.) The reaction can be shown most easily, for example, in the rabbit and guinea-pig—in higher animals (such as the dog or cat) decerebration may be necessary. The reactions may persist as long as a year after labyrinthectomy and other operative interference.

### **(D). Summary of the Data on which these Findings are Based.**

#### *(a) Operative:—*

- (1) Removal of brain down to entrance of the eighth nerve.
- (2) Removal of brain down to "origin" of the first posterior cervical nerves.
- (3) Section of the upper three posterior cervical nerves.
- (4) Section of one or both eighth nerves.
- (5) Labyrinthectomy—either one or both sides.
- (6) Centrifugalisation (with the body vertical and the nose upwards) some one or two thousand times a minute for one or two minutes. The procedure is carried out "under ether" and provides a method of isolated destruction of the otoliths, the function of the semicircular canals being left undisturbed. (First suggested and described by Wittmaack in 1909.)

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The deductions which may be made from the above operative investigations are sufficiently obvious.

The experimental operative research is controlled by :—

- (1) Detailed examination of the animals and their response to movements prior to operation—all of which are carefully noted.
- (2) Detailed record of the operative interference.
- (3) Retesting the various reflexes subsequent to operation.
- (4) Eventual post-mortem examination.
- (5) Comparison of data thus obtained.
- (6) Summarisation of results and effects.

(General anæsthesia and local anæsthesia are employed in all cases.)

(b) *Accurate anatomical dissection and preparation of models* therefrom indicating the position of the otoliths and their relation to various movements of the body, as a preliminary procedure, serve to check the steps of the above operative investigation, and also provide a ready reference in the examination of the animal on :—

(c) *The Examination Table.*—An apparatus whereon the animal can be secured in any position and rotated or moved in various directions. With the assistance of a camera fixed on the table, and moving in exact conformity with the animal, an accurate record is obtained of the movements of the eyeball as indicated by a “cross” previously branded (under cocaine) on the cornea.

(d) *The Experiment of Kreidl on the Crustacean, Palemon.*—Kreidl noted that when this animal “moults,” the calcareous particles in the otocyst are expelled and fresh particles taken in. He therefore provided a medium containing only iron granules for an animal in this phase. Afterwards he was able to demonstrate by the application of a magnet definite movements corresponding to definite positions of the magnet in relation to its head.

(e) *The control histological work of Professor Winkler*, as set forth in his classic treatise on the eighth nerve (see Bibliography)—an account of special research which merits a separate discussion to itself.

### (E) Clinical Application.

Professor Magnus and Dr de Kleijn, the chief investigators in this research, have collected eight cases (see Bibliography) all



## Saccular, Utricular, and Allied Reflexes

instances of lesions of the cerebrum, and corresponding more or less to the condition of "decerebration." They consist of cases of hydrocephalus—hæmorrhage into the ventricles, meningitis, gumma cerebri, and idiot children. All these showed the "neck reflexes," and four of them showed certain of the "otolithic reflexes." Twenty-six normal children, under the age of three and a half months, were examined—in none could the "neck" reflexes be elicited—but in twenty-three certain of the "otolithic" reflexes could be demonstrated.

The dancing mice of Japan show phenomena which may quite possibly be due to pathological lesions of the otoliths, and incidentally it is thought by some writers that these lesions are analogous to those which constitute some of the forms of "hereditary deafness" in man. The study of the lesions in these mice may thus possibly afford some help in this direction.

Some writers consider that disturbance of the otoliths constitutes the main element in the production of sea sickness.

The inclination of the head to the same side after labyrinthectomy, or in certain pathological lesions of the labyrinth, is also proved by these investigations to be an otolithic reaction, due to an effort to maintain the head in that position, wherein the remaining intact otolith is "at rest," and so the disturbance of balance is avoided as much as possible.

These researches, too, have led to the conclusion by Hoshino that probably the cerebellar hemispheres are not necessarily concerned with the static condition of the body, but may be merely subsidiary central "stations" whose functions, after their ablation, can be easily assumed by the larger brain. On the other hand the central control of "vestibular nystagmus" and "by-pointing" is probably located in the cortex of the middle cerebellar lobe\* (see Bibliography).

### (F) Some Phylogenetic Theories.

From the literature on the subject, and as the result of conversations with the authors of these investigations, fascinating reflections may be suggested. For instance, to such a primitive animal as a fish in a medium, such as water, the necessity of some mechanism whereby balance may be maintained by the assistance of the elemental force of gravity, is at once apparent.

\* Since this communication I have seen a hydrocephalic child in whom certain of these reflexes can be elicited.—A. R. T.

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For this purpose the balancing apparatus must automatically control the musculature of the body—the dead fish, as is well known, turns belly upwards—to this purpose, therefore, the otolith apparatus and its connections are developed. Automatic progression is controlled by the “neck reflexes” resulting from movements of the head.

The next item of importance is provision that the animal can locate his prey or danger. This sense, it is suggested, is situated in the “lateral line” organ through which it obtains perception of the movements of the medium in which it lives, and is able to respond to vibrations up to some 15 D.V. per second. The “lateral line” was formerly considered to represent a branch of the tenth nerve, but it is now held by one school to correspond more closely to the eighth. Thus, together with the primitive reflexes which control balance and progression is developed a “sense” which utilises these to the animal's welfare.

In the next medium—air—the “lateral line” disappears and a “cochlea” and auditory nerve begin to develop; whilst, when we come to the animals living on land, and the automatic control of movement in a third dimension is no longer necessary, the third otolith (the “asterisk” in the lagena) ceases to be found. “Balance” and “perception of sound,” it is suggested, are associated intimately from very early phylogenetic times, and that this close association still persists is evidenced not only by the proximity of the vestibular and auditory organs, but by the obviously still persistent influence of sound on movement (*e.g.*, dancing, melody, marching, or, for instance, the inevitable “start” that follows unexpected noises).

This theorising on the sequence of development may be carried yet further: the use of “sound,” in controlling movement demands an apparatus for producing “sound,” and thus necessity for “voice” and its mechanism is developed—and with “voice” comes “language,” and, finally with “language” that attribute only found in the highest animals—intelligence.

In conclusion, mention should not be omitted of the apparatus evolved by Professor Quix for systematically investigating the Rotation Tests, his conjoined method of graphically representing the “By-pointing” reaction, and his ingenious adaption of “Gradenigo's Figures” by microscopical modification, towards the standardisation of the hearing tests by tuning forks.

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Nor should the visitor interested in our specialty neglect to call on Professor Zwaardemaker and see the various appliances in the Physiological Laboratory for testing the sense of smell, which when standardised must form a most valuable assistance in our work, not only from a "peripheral" point of view but also as a means whereby lesions of the olfactory tracts may be located, and thus constitute some help towards the recognition of affections in the "silent" frontal area of the brain.

In the same laboratory the "Camera Silentissima" should also be visited—where experimental tests of sounds can be performed in a medium, as near as possible insulated from the various current and constant vibrations of our environment.

These and much else make a visit to Utrecht a valuable and liberal education. If others are only half as fortunate as I, they cannot fail to be impressed with the extreme courtesy and kindness offered. This, in my case, extended to the devotion of many hours on my behalf, not only in patient explanation of the details and results of their past and present research, and to even the actual performance of much experimental work, but also towards a continuous and solicitous care for my personal comfort and entertainment in general.

## BIBLIOGRAPHY.

Amongst the extensive literature on the subject, the following references have been selected as practically comprising an account of the work done in this direction:—

Kleijn, A. de, "Zur Technik der Labyrinthexstirpation und Labyrinth-ausschaltung bei Katzen," *Sep.-Abdr. a. d. Archiv f. die ges. Physiol.*, Bonn, 1912, cxlv. Magnus, R., und Kleijn, A. de, "Die Abhängigkeit des Tonus der Extremitätenmuskeln von der Kopfstellung," *Sep.-Abdr. a. d. Archiv f. die ges. Physiol.*, Bonn, 1912, cxlv. Magnus, R., "Welche teile des Zentralnervensystems müssen für das Zustandekommen der tonischen Hals- und Labyrinthreflexe auf die Körpermuskulatur vorhanden sein?" *Sep.-Abdr. a. d. Archiv f. die ges. Physiol.*, Bonn, 1914, clxx. Magnus, R., und Kleijn, A. de, "Weitere Beobachtungen über Hals- und Labyrinthreflexe auf die Gliedermuskeln des Menschen," *Sep.-Abdr. a. d. Archiv f. die ges. Physiol.*, Bonn, 1915, clx. Magnus, R., "Stellreflexe beim Zwischenhirn und Mittelhirnkaninchen," *Sep.-Abdr. a. d. Archiv f. die ges. Physiol.*, Bonn, 1916, clxxiii. Burlet, H. M., und Kleijn, A. de, "Über den Stand der Otolithenmembranen beim Kaninchen," *Sep.-Abdr. a. d. Archiv f. die ges. Physiol.*, Bonn, 1916, clxxiii. Hoeve, J. van der, und Kleijn, A. de, "Tonische Labyrinthreflexe auf die Augen," *Sep.-Abdr. a. d. Archiv f. die ges. Physiol.*, Bonn, 1917, clxix. Kappers, C. U. Ariëns, "Kurze Skizze der phylogenetischen Entwicklung der Oktavus und Lateralisbahnen mit

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Berücksichtigung der neuesten Ergebnisse," *Sep.-Abdr. a. d. Zentralblatt f. Physiol.*, xxiii. Nr. 17. Kleijn, A. de, "Actions Réflexes du Labyrinthe et du cou sur les Muscles de l'Oeil," *Archives Néerlandaises de Physiol. de l'homme et des animaux*, 1918. ii. 4e livraison, p. 644. Kleijn, A. de, und Magnus, R., "Kleinhirn, Hirnstamm und Labyrinthreflexe," *Sonderabdr. a. d. Münch. Wochensh.*, 1919, Nr. 20, S. 523 und 524. Magnus, R., "Stellreflexe beim Kaninchen nach einseitiger Labyrinthexstirpation," *Sonderabdr. a. d. Archiv. f. d. ges. Physiol.*, clxiv. Pflüger's *Archiv für die gesamte Physiologie des Menschen und der Tiere*, Sonderabdruck aus 186 Band, Heft 1-3. Oort, E., *Über ein Modell zur Demonstration der Stellung der Maculae acusticae in Kaninchenschädel*. Kleijn, A. de und Magnus, R., *Über die Funktion der Otolithen*. I. Mitteilung, *Otolithenstand bei den tonischen Labyrinthreflexen; Labyrinthreflexe auf Progressivbewegungen; Über die funktion der Otolithen*; II. Mitteilung, *Isolierte Otolithenausschaltung bei Meerschweinchen*. Kleijn, A. de, *Tonische Labyrinth und Halsreflexe auf die Augen*, Berlin, Verlag Von Julius Springer, 1921. Quix, F. H., "La Fonction des Otoliths," *Archiv. Néerlandaises de Physiol.*, 1921, vi. 1e livraison, p. 1. Winkler, Cornelius, "Opera Omnia," 1921, vii. Hoshino, T., "Beitr. zur Funktion des Kleinhirnwurmes beim Kaninchen," *Acta Oto-Laryngol.*, 1921, Suppl. ii.

## EPITHELIAL INLAY IN RADICAL MASTOID OPERATIONS.\*

By E. HAMILTON WHITE, Montreal.

THE idea of skin grafting the bone cavity after a radical mastoid operation has long been advocated by Sir Charles Ballance. While the advantages have been recognised, it has never been widely popular owing to the difficulty of technique and uncertainty of result.

By the use of the present technique the operation is made extremely simple and rapid, and the success of the graft is practically assured. The method is an application of Esser's idea of epithelial inlay to the local surgical needs of a radical mastoid operation. The idea of using it was suggested to me last summer by Major E. F. Risdon, C.A.M.C., who had used it widely in his plastic surgery about the face and mouth. The present paper is really a preliminary report, further cases will be reported later by Major Risdon and Lieut.-Colonel Perry Goldsmith, of Toronto.

The question as to whether the skin grafting should be done at the time of the primary operation or as a secondary operation, ten days or so later, is not important for the present report, which is concerned only with the technique of the grafting, which is the same for all cases. Where the skin grafting is done as a secondary operation the plastic should be postponed and done at the same time. In both my cases the grafting was done as a secondary operation for the reasons stated in the reports.

The cavity is prepared in the ordinary way by curetting and flushing with warm saline. The wound being ready for grafting, an exact cast of the bone cavity is made by pressing into it a piece of dental compound (stent). The stent is softened by immersion in hot water, but the water must not be boiling or it renders the compound too soft and sticky. As soon as it hardens the cast is withdrawn from the wound, a skin graft is laid over it with the cut surface outward, and it is then pushed back into position.

\* Reported before the Montreal Medico-Chirurgical Society, 2nd December 1921.

## E. Hamilton White

This simple technique insures an even distribution and close contact of the graft with the walls of the cavity. The close contact with the wound surface insures good nourishment, and prevents the collection of serum between the walls of the cavity and the graft which would tend to displace the graft, and would also predispose to infection. The dental compound being non-absorbent, there is no discharge soaked dressing to encourage bacterial growth in the wound.

A further advantage of the technique is that the flaps of the plastic are held firmly in good position, and rapid healing encouraged.

The cast remains in position a week, unless some untoward circumstance calls for its removal. In my cases it was removed through the retro-auricular opening, as it was felt that an attempt to remove it through the enlarged meatus was adding unnecessary difficulty to the operation, and the delay caused by keeping the wound open a week is trifling, as upon removal of the cast it heals rapidly without suture.

The great advantage of a skin graft following a radical mastoid operation is the rapidity of healing. Another thing gained by skin grafting, if successful, is that the walls of the bone cavity are brought to rest, and the tendency to exuberant granulations and cicatricial narrowing of the cavity is done away with. The tendency to unhealthy granulation is especially associated with malnutrition of the patient.

The two cases in which the method was used are of some interest, and were as follows:—

CASE I.—W. S., female, aged 21. Admitted to Royal Victoria Hospital, 29th June 1921, with a history of active discharge from the right ear for two years without earache, but for the last few months with headache. The origin of the suppuration was obscure, dating back to childhood.

The patient is a cripple from old hip-joint and spinal disease, but at present these lesions are healed and she looks fairly healthy. There is no evidence of any active trouble in the ear.

The right ear showed a destruction of the posterior half of the drumhead and a moderately free purulent discharge from the attic. The functional tests showed doubtful remains of hearing, only loud voice at the ear, but the vestibular reactions were present indicating an intact labyrinth.

*Radical Mastoid Operation*, 11th July.—At the operation the mastoid showed a chronic abscess in the region of the antrum and

## Epithelial Radical Mastoid Operations

body of the mastoid. The cavity was filled with granulations, but there was no evidence of cholesteatomatous matrix. In removing the overhanging edges of the cavity the dura was exposed to a considerable extent in the region of the middle fossa. For this reason the cavity was left open and allowed to granulate until 20th July when the plastic and skin graft were undertaken. The cavity was curetted and grafted as above described.

No pain or discomfort was experienced after the operation, and the cast was removed one week later without an anæsthetic. On removal of the cast the cavity was beautifully lined with skin which remained healthy and showed the complete success of the skin graft.

In this case the graft was cut from the side of the calf, as owing to her crippled condition it proved the easiest area from which to procure the graft.

The patient was discharged on 13th August, approximately three weeks after grafting the cavity, at that time being well healed. The case has been under observation since, and has remained permanently dry.

CASE II.—M. W., female, aged 42. Was admitted to the Royal Victoria Hospital 22nd July 1921, complaining of dizziness, vomiting, and discharge from the left ear. The history was of an attack of pain in the left ear three weeks ago, followed by discharge which gave relief. The discharge stopped after a day or two, and the patient felt fairly well. She then noticed the onset of dizziness on walking or standing, and this was associated with vomiting. The dizziness was always associated with movement, and has disappeared while lying in bed.

The history of the original onset of the trouble in the ear could not be obtained, but the suppuration was evidently a matter of old standing though apparently quite latent for many years. The hearing in the left ear was relatively good, conversation voice at 6 or 8 feet. There was a perforation of the posterior upper quadrant of the drum-head, and a small amount of purulent discharge with foul odour. There was a spontaneous nystagmus to the left, unsteadiness on standing, and a tendency to fall to the right. The right ear was normal.

On applying the fistula test, although only gentle compression was used, a violent reaction was produced, the patient throwing her body to the right. A diagnosis of a chronic mastoiditis with a labyrinth fistula was made. Dr Russel our neurologist agreed, and reported no evidence of intracranial involvement.

*Radical Mastoid Operation, 27th July.*—At the operation a small antrum was found, deeply placed, and filled with cholesteatoma, and a large fistula was readily seen in the lateral semi-circular canal.

## E. Hamilton White

Owing to the small deeply placed antrum an extensive exposure of the middle fossa occurred with the removal of the overhanging edges. In this case a primary skin graft would have been definitely dangerous owing to the presence of the fistula.

The wound was allowed to granulate for three weeks, and then grafted as in the other case; the plastic being done at the same time as the graft on 17th August. Only a small graft was required, and this was taken from the front of the thigh. The operation was followed by no undue reaction, and the cast was removed in a week. The patient was discharged on 7th September, well healed, approximately three weeks after the application of the skin graft.



# THE DIAGNOSTIC VALUE OF TRANSILLUMINATION OF THE MAXILLARY ANTRA.

By E. WATSON-WILLIAMS, M.C., Ch.M., Registrar, Ear, Nose, and Throat Department, Royal Infirmary, Bristol. Visiting Aural Surgeon, M. of P. Hospital, Bath. Consultant Surgeon for Diseases of Ear, Nose, and Throat, Pontypool Hospital.

IN 1911, Dr P. Watson-Williams<sup>1</sup> directed attention to the possible errors in diagnosis of antral disease based on the transillumination test. He cited two cases in which, although the antra gave clear illumination and good pupil reflexes, they were found to contain pus. With a dark room at hand the test can be performed simply and rapidly: and it is of interest to inquire what proportion of error may occur in a procedure which is acknowledged to be only approximate. For this purpose I have examined the records of all in-patients at the Throat Department of the Bristol Royal Infirmary between 1909 and 1917,<sup>2</sup> and have found 259 in which examination of the antral walls or contents has allowed the results of the test to be checked.

The test was performed in a dark room with a light of moderate intensity. The result is expected to exclude disease in those cases where both antra illuminate well and equally, and with good pupil reflexes. Unequal illumination was regarded as a sign of disease. From Table A we infer that a diagnosis of disease based on unequal illumination is correct in five cases out of six.

TABLE A.<sup>3</sup>

*Unequal transillumination observed in 63 cases = 24 per cent.*

Antral disease was found in . . . . .	52
The antra were found apparently healthy in . . . . .	11

In the whole series of 259, both antra were dull in 90 cases. Adding these to the cases in Table A, we find that the test indicated disease in 153 cases, *i.e.*, in 59 per cent. of the whole, and absence of disease in 106, *i.e.*, in 41 per cent. The condition of the antral walls and contents was investigated by operation and by puncture through the middle meatus,<sup>1</sup> washing with

## E. Watson-Williams

the suction syringe, and examining the fluid withdrawn. In Table B the results of investigation are considered from the point of view of macroscopic appearances. Antral disease was diagnosed from the presence of polypi, polypoid degeneration of the mucosa, and pus or turbidity in the fluid withdrawn. When the return was clear, slightly bloodstained, or contained only a little mucus, the antrum was considered healthy. As a matter of interest cases in which nasal or postnasal discharge was a symptom have been separately recorded.

TABLE B.<sup>3</sup>

Exploration.	Antra Bright and Equal 106=41 per cent.		Antra Dull or Unequal 153=59 per cent.	
	Healthy.	Diseased.	Healthy.	Diseased.
Cases with discharge . . .	41	23	29	96
Cases without discharge . . .	30	12	10	18
TOTALS {	71	...	...	114
	...	35 74=29 per cent.	39	...

From this table we see that in about two cases in seven the diagnosis based on the test was not confirmed. In rather more than half, the result is not serious, since, where infection is diagnosed, further investigation may be made; at the worst, the patient is needlessly submitted to an operation of which the risk is very small. But if one had *relied on the illumination test to exclude* antral disease 35 of the 259 cases investigated, that is 20 *per cent. of the 139 cases of gross disease, would have been overlooked.*

One obtains a more accurate estimate of the diseased or healthy condition of the antra by pathological investigation of the return fluid. The nature of the test by transillumination hardly fits it to reveal infection without gross change. But the proportion of fallacious results is even higher when we investigate by culture the clear returns. This investigation has been made and the results are included below in Table C; in a few cases in which this was not done the apparently healthy returns have been counted as sterile.

# Transillumination of Maxillary Antra

TABLE C.

*The results of Table B corrected by culture of the apparently healthy return fluid.*

		Antra Bright and Equal, 106.			Antra Dull or Unequal, 153.		
Exploration.		Clear.		Diseased.	Clear.		Diseased.
Culture.		Sterile.	Infected.		Sterile.	Infected.	
Cases with discharge .		21	20	23	13	16	96
Cases without discharge .		16	14	12	5	5	18
TOTALS	Test confirmed .	37	...	...	...	21	114
	Test fallacious .	...	34	35	18	...	...
			69				
			87				

From this table we see that 69 cases, or 34 per cent. of the whole 204 cases of disease, were not revealed by the illumination test. If we consider separately the cases in which discharge was not a symptom—those cases for which a test is most desirable—we see that of a total of 49 cases of antral disease, 26 were not indicated by transillumination.

The value of the test by transillumination depends chiefly on the accuracy with which it enables us to exclude antral disease. Many cases can be diagnosed from symptomatology and by rhinoscopy, and it is for the doubtful cases that an accurate test is desirable. The transillumination test in this series failed to reveal 20 per cent. of the cases of gross disease, 34 per cent. of all cases of disease, and more than half of the cases of antral disease without discharge.

My thanks are due to Dr P. Watson-Williams for permission to use records of cases that had been under his charge in the Bristol Royal Infirmary.

REFERENCES.—<sup>1</sup> At the Birmingham Meeting of the B.M.A. 1911, *Journal of Laryngology*, March 1912. <sup>2</sup> Since 1917 the test has not been used as a routine. <sup>3</sup> Percentages are per cent. of the 259 cases.

## THE INFLUENCE OF ORAL SEPSIS ON THE COURSE OF CANCER OF THE THROAT.

By DAN M'KENZIE.

THE following brief note refers to cancerous ulcers of the pharynx and cesophagus and not to cancer of the glottic region of the larynx, as that is not exposed to direct infection by the buccal secretions.

Diathermy, as is now well known, even in advanced and ineradicable cancers of the throat, leads to a temporary amelioration in the appearance of the ulcer. After the sloughs separate there follows a period of quiescence during which the surface of the growth is pale and indolent in appearance, while pain and difficulty in swallowing become considerably easier. But this quiet interval does not last for more than a few weeks at the most. Sooner or later, and often quite suddenly, the signs of inflammation reappear and the growth once more begins to show rapid advances.

Obviously, what takes place is that the application of the diathermy sterilises the growth area and renders it for a time aseptic, and then after a brief period the vulnerable cancerous tissue becomes infected again.

Something similar may be observed when our cases of throat cancer are treated with the regular intravenous injection of copper alanine. As long as the injections are continued, the surface of the growth manifests a dullness of hue such as we associate with the less virulent types of the disease. But subsequent events prove that, unfortunately, the growth itself, as such, is uninfluenced by the action of the drug.

Now, it has occurred to me lately that in a small group of cases of untreated throat cancer the progress of the disease is curiously slow. The history of such a case may reveal the fact that the symptoms have been in existence for many months before we first see it, and while the case is under observation we may be able to assure ourselves that the type of cancer is, for some reason or another, of a less rapidly advancing character than those we generally encounter. One case I can recall in which the disease, a post-cricoid carcinoma, was known to be in existence for no less than seven years!

In seeking a reason for this unexpected sluggishness, I hit

## Oral Sepsis in Cancer of the Throat

upon the interesting fact that all the slow cases I had seen had been found in people who were edentulous, and who had been edentulous before the symptoms of cancer appeared ; while on the other hand, in the ordinary, or what we may call the septic class, teeth were still present in the mouth. It does not seem to matter whether the teeth be few or many, as I have recently had under my care a case with only one tooth left, in which, nevertheless, the cancer ran a very rapid course.

I am making this communication chiefly to draw the attention of other observers to the matter, as my own experience is too small to warrant me in claiming as a fact what may only be a coincidence.

My suggestion is, that when all the teeth have been removed the mouth secretions are much less virulently infective than when the teeth are present, and that the progress of the cancerous growth is rendered slow or rapid in consequence of this very simple circumstance. That septic infection has a powerful influence in stimulating cancerous growths is well known.

There is another point which favours my suggestion and that is that many, if not most cases of throat cancers die, not of hæmorrhage, nor in these days, of asphyxia or starvation, but of septicæmia. The cervical glands enlarge rapidly and break down, while the patient succumbs with all the signs of severe septic intoxication.

Finally, it is worth while remarking that until these considerations are proved to have no basis in fact, the palliative treatment of ineradicable throat cancers by diathermy ought to be preceded, as in other grave surgical operations on the pharynx and œsophagus, by the extraction of all the teeth.

## CLINICAL RECORD

### INTRANASAL DACRYOCYSTOSTOMY: AN EASY METHOD OF APPROACH.

By ANDREW CAMPBELL, M.B., F.R.C.S. (Edin.), Port Elizabeth.

RECENTLY a female patient with chronic dacryocystitis was referred to me after conservative treatment had failed. I agreed to do an intranasal operation, but I did not see the patient before meeting her in the operating room. She was nervous and rather apprehensive about pain during the operation. We reassured her and packed the nose with cocaine 10 per cent. and adrenalin; the sac was injected with novocain  $\frac{1}{2}$  per cent. She had previously been given  $\frac{1}{4}$  gr. morphine hypodermically.

The nose was narrow and the ascending process of the maxilla very much in the way. The greatest difficulty was found in seeing the area of operation, and I confess to working a great deal by touch. The ascending process was thick and the patient felt pain so much when the hammer and chisel were used, that we considered it advisable to use a general anæsthetic. This was done and the operation completed. The result was good and the patient wished to have the other side done.

The other side presented the same difficulties, and we thought that a combined external and internal operation as advocated by Mosher<sup>1</sup> might be better, but the patient preferred the intranasal operation. I decided to operate from the opposite side of the nose through the septum. The usual incision for submucous resection of the septum was made and the mucous membrane reflected for about a quarter of an inch, then the cartilage and mucous membrane of the opposite side were cut through together, a quarter of an inch posterior to the original incision. A Killian nasal speculum pushed the septum aside and gave a perfect view of the field of operation. The septum was replaced after operation without difficulty, no stitch was necessary, but a little packing was introduced for eighteen hours. Perfect healing and apposition resulted.

The septal window gives a good avenue of approach to the anterior ethmoid cells, but in this case the posterior part of the nose was not open to inspection. If the septum was resected it would probably solve that difficulty. The upper surface of the

# Measuring "Bridge" in Mastoid Operation

inferior turbinal was directly in view, and it would be easy to do an intranasal operation on the maxillary antrum by removing the anterior part of the inferior turbinal or by merely fracturing it upward. The outer nasal wall would then be plainly seen. By dislocating the septum into one side or the other, both sides of the nose can be operated on.

It may not be advisable to use this route in all cases, but where there is any difficulty in seeing the operation area, or if the nose is narrow, I think it will help to solve the problem of approach.

REFERENCE.—<sup>1</sup> Mosher, "The Mosher-Toti Operation on the Lachrymal Sac," *Laryngoscope*, vol. xxxi. No. 5, p. 284.

## INSTRUMENT FOR MEASURING THE "BRIDGE" IN MASTOID OPERATION

Mr T. B. JOBSON (London, W.) writes: "This instrument, which I have named the Pontimeter, is for measuring the depth of the "bridge" in the mastoid operation. It is a sliding callipers made in the shape of the



Dundas Grant probe with the Heath ribbed type of handle, which gives great delicacy of touch. In use the slide is drawn up so that the points are about an inch apart. The point A is inserted in the aditus and the slide lowered until the point B rests on the bridge. The depth of the bridge A B can then be read off instantly on the scale, which is graduated in millimetres. The instrument can be used as an ordinary mastoid probe when the points are approximated. It is made by Messrs Mayer & Phelps."

# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLGY

January 20th, 1922.

President—DR A. LOGAN TURNER.

Discussion on Dr A. R. Tweedie's Paper upon "The Research Work in Utrecht, on the Saccular, Utriclar and Allied Reflexes" (*Journal of Laryngology*, May 1922, p. 213).

MR SYDNEY SCOT welcomed Mr Tweedie's account of his experiences at Utrecht, for he had brought to the notice of the Section some of the most important facts in connection with this new research in otology since the original discovery by Flourens, that the labyrinth was concerned in some way or other with co-ordination. He regarded Winkler's experiments as perfectly wonderful. Everyone had realised the great difficulty attending the differentiation of function of the saccule, utricle, and semi-circular canals. We could interfere physically with the labyrinth as a whole or with the semi-circular canals more or less individually, without necessarily disturbing the utricle or saccule, but until the idea was conceived of employing *centrifugal force to detach the otoliths* from the utricle or saccule, without interfering with the canals or tympanic structures, the difficulties had seemed insurmountable. He believed the results so far obtained threw so much new light on the subject that the physiology of the labyrinth in its bearing on the nervous system would have to be reconsidered. He asked if Mr Tweedie could say whether different results were obtained by centrifugalisation before and after decerebration? Had the observers whose investigations he had described been able to exclude any possible effect of high-speed centrifugalisation on the blood supply of the brain cortex? He assumed, of course, that this had been fully considered. He would like to ask whether those investigations had led the observers to negative Bárány's hypothesis in connection with localisation of arm and leg areas in the cerebellar cortex?

Dr WILLIAM HILL asked to which of the two the utricle was more closely related—to the saccule, or to the semi-circular canal system.

Dr ALBERT A. GRAY said he agreed with the view put forward by Mr Tweedie that these reflexes were developed in response to stimuli of movement. This was borne out by the fact that, in the case of animals with delicate head movements, the vestibule and canals were well developed. In fish, which had a graceful and easy movement, it was so. Amphibia showed a less developed organ of equilibration; and the same condition is found in some reptiles such as tortoises. The movements of crocodiles and lizards were quicker and more delicate, and the apparatus was consequently better developed than in tortoises. Birds had large canals with a rich nerve-supply. The same held good to a less extent of mammals. He prepared recently the labyrinth of a giraffe, in which the canals and vestibule were very well developed. In the porpoise and sea-cow there was a poor



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equipment in this regard. Therefore, comparative anatomy confirmed the idea put forward, that it was the delicacy of movement which brought about the development of the organ. It was not so easy to explain why the cochlea developed from the saccule. The winged insect developed a hearing apparatus entirely independent of the statocyst. It had its otolithic apparatus in one structure, while the hearing apparatus might be in one of various parts of the body such as the forelegs. Dr Gray thought that the development of a hearing organ was to be associated with the change from a life in water to a life in air. Air was a compressible medium, and water was incompressible.

Mr TWEEDIE (in reply) said the animals had been kept a year after centrifugalisation and showed no apparent symptoms except the disappearance of those reflexes. As to Bárány's work, Hoshino showed that the cerebellar hemispheres were only a subsidiary centre, and so long as the cortex of the central lobe of the cerebellum remained, it did not much matter whether there was a cerebellar hemisphere or not. If total labyrinthectomy were done on each side, the only reflexes which persisted were the neck reflexes. In answer to Dr Hill, there was no doubt, he thought, that the utricle was the parent of the semi-circular canals.

## **A Modification of the Mastoid Operation for Early Suppuration in A-Cellular Mastoids—DAN M'KENZIE, M.D.**

The modifications consist in making only a short incision corresponding to the upper half of the auriculo-mastoid angle, in an exposure limited to the suprameatal triangle and its immediate neighbourhood: and, after the antrum has been opened, in the provision of drainage through a window made in the postero-superior wall of the membranous meatus, the posterior incision being entirely closed.

The operation is suitable only for early suppuration and when the mastoid process is a-cellular. In cellular mastoids when the cells have become infected, the ordinary Schwartze is obviously necessary, and if the disease is chronic, the radical operation is called for.

In children the operation is quickly and easily performed. The "window" in the meatus closes readily.

The object of the meatal window is to secure a more direct drainage of the antrum than can be obtained in a cellular mastoid from the posterior wound after the auricle has been replaced.

The operation may be recommended to those who favour early drainage of the mastoid antrum in suppuration of the middle ear which is not promptly cured by paracentesis, but its use is limited to this single variety, as infected cells in the body and tip of the process lie below the level of the meatal window.

Mr SYDNEY SCOTT said that he was afraid it would be easy to overlook groups of unsuspected mastoid cells. He preferred to open the mastoid behind, and make certain of its anatomical structure and what cells there were to be opened. Although Dr Dan M'Kenzie was in favour of the

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procedure, he could not feel justified in adopting it, or recommending others to do so, in place of Schwartz's operation.

Mr ARTHUR CHEATLE said the only way to ascertain whether an a-cellular temporal bone was being dealt with was to have a skiagram taken. With regard to making an opening in the meatus, the cases did so well under the ordinary procedure, that he did not care to run additional risk by doing the operation now described.

Dr DAN M'KENZIE replied that he did not expect that the highly orthodox members of this Section would accept this or any other modification of the mastoid operations. He himself did not feel any disappointment in regard to what he carried out, and intended to continue its use in suitable cases.

## EXHIBIT.

**The Thermionic Valve of Professor J. H. Fleming—a Piece of Apparatus capable of amplifying Sound, with a Demonstration to show the Possibilities of applying the Thermionic Valve to aid the Deaf—**Mr ROBINETT SCRUBY. (Introduced by Mr Frederick Spicer.)

So far the thermionic valve has not proved any more efficient than one of the simple forms of telephones for the deaf possessing the most suitable pitch, wave form, and strength for the particular case, built up from the data derived from testing a case with a properly designed testing instrument. Yet we know that such an instrument does not amplify the sound, but alters the quality of the sound, whereas the thermionic valve amplifies the sound to a marked degree. This bears out the fact that it is better to alter the voice to suit the particular form of deafness rather than to shout at the deaf person.

An electrical aid, sound collector, tube, or trumpet will be found to give the best result if made up as follows after a careful test:—

	Wave Form.	Pitch.	Volume of Sound.
Middle ear . .	Sharp peaked, not rich in harmonics	High	According to degree of deafness
Otosclerosis . .	Rounded	High or low	According to degree of deafness
Nerve deafness .	Well rounded, rich in harmonics	Low	No great volume of sound

Electrical aids can be varied in wave form, pitch, and volume of sound, but are seldom used for nerve deafness. Sound collectors, tubes, and trumpets can only be varied in wave form, but certain types are very useful for nerve deafness. When we are in a position to vary at will the wave form and pitch of the thermionic valve, there is every reason to believe that the deaf will get a very much increased range of hearing.

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## SECTION OF LARYNGOLOGY

February 3rd, 1922.

*President*—Sir WILLIAM MILLIGAN, M.D.

**Carcinoma of the Œsophagus perforating into the Trachea at the Bifurcation; Report of a Case and Demonstration of Specimen**—H. V. FORSTER, M.B.—Male, aged 45, a week previous to examination, whilst taking tea, had a violent fit of coughing followed by pyrexia and signs of pneumonia. He had complained of vague pains in the chest for several months, but there was only a definite history of a week's illness. Water, when taken, was almost immediately coughed up. X-rays revealed complete arrest of food at the ninth dorsal vertebra, the trachea lined by portions of the barium meal, and the œsophageal appearance typical of malignant stricture. The *post mortem* showed a perforation just below the bifurcation of the trachea, caused by malignant disease, originating in the œsophagus.

THE PRESIDENT said he had seen cases of this kind: a lady who had been ill for months, and was supposed to be suffering from a neurosis, expectorated a little blood and complained of her throat and of dysphagia. He suspected organic disease. On examination he found,  $1\frac{1}{2}$  inches below the vocal cords, a small fungating, mulberry shaped, œdematous, vascular granulation; this, with the accompanying symptoms, made him think it was malignant disease of the œsophagus perforating into the trachea. Patient died in five weeks from a severe hæmorrhage from the ulcerating area, and autopsy showed that the growth had extended from the œsophagus into the trachea. A male had had paralysis of the left vocal cord for some time, but no definite cause could be assigned. After a sharp attack of coughing he brought up blood; next day, there was a violent hæmorrhage, and death occurred a few days later. Autopsy showed a malignant growth, which had ulcerated into the lower end of the trachea.

Dr W. HILL advised suspected cases to swallow a little water, and if this was coughed up twenty or thirty seconds after being taken, there should be at least a suspicion that there was a communication between the trachea and œsophagus. Where the œsophagus was involved by malignant growth, or with growth in juxtaposition to the œsophagus, the perforation was nearly always into the left bronchus, rather than into the trachea. In the present case it was near the bifurcation of the trachea. He assumed, therefore, it was in the lower end of the trachea, as observed by screen examination following a bismuth meal. Sometimes the aperture was valvular, and solid food did not always pass through it. It was necessary to eliminate cases in which there was a pharyngeal growth with the overflow of bismuth entering the air passages: in those cases the bismuth could be seen passing down the trachea. Was the perforation in this case into the trachea, and not into one of the bronchi? He advised intubation of the œsophagus or gastrostomy.

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Sir JAMES DUNDAS-GRANT remarked that in the few cases he had seen, one had the perforation an inch below the larynx. Michel, of Hamburg, had described a means of dealing with such a case, by inserting a long tracheotomy tube with an expanding india-rubber cover, which could be distended with air, or better, with glycerine, so as to cover the fistula.

Mr DOUGLAS HARMER remarked on the capacity of these people to live long after perforation had occurred. One of his patients coughed water back the moment after he had swallowed it. As observed by X-rays, a thick bismuth meal at once went into both his main and secondary bronchi. He thought no treatment was possible in that case, and did not advise gastrostomy. The patient, however, still went on with his business, did not suffer any pain, and lived over a year.

Mr FORSTER (in reply) said that in this case a screen examination and a rapid exposure photograph showed that a barium meal passed down the œsophagus and then came to a stop, a portion trickling through a small opening into the trachea. The skiagram showed the trachea lined by barium. The case favoured Dr Hill's view that the usual site of perforation was the left bronchus, the perforation being on that side of the bifurcation of the trachea ; and the septic pneumonia was traced from the left bronchus. Mr Forster thought, after he had referred the patient for gastrostomy, that an attempt might have been made to insert a Symonds tube, but he died before anything could be done. He only saw the case a few days before death.

**Mucocele of the Left Frontal Sinus ; Report of a Case and Demonstration by Photographs**—H. V. FORSTER, M.B.—Male, aged 35, had displacement of the left eyeball for eighteen years. The condition commenced as an acute orbital cellulitis, pus being evacuated. The proptosis increased, the eye could not be closed and vision was lost. There was a tense fluctuating swelling beneath the left eyebrow, and the X-rays showed a large left frontal sinus. At the operation the sinus contained a great quantity of translucent brown-stained fluid, contained in a thin membranous lining. There was considerable absorption of bone, the greater part of the sinus floor having disappeared. Nasal drainage was established: slight vision in the left eye had returned and the orbital muscles were regaining function.

**Case of Palato-labial Dysarthria in a Middle-aged Man**—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—Male, aged 50, complained of a constant cold; the nose and nasopharynx were free, but the palate was almost immobile, and the action of the lips in articulation extremely defective; the tongue had apparently entirely escaped and the vocal cords, beyond a slight paresis of the internal tensors, moved perfectly. This case differs from an ordinary case of bulbar disease. Patient is peculiar in his manner, and probably has general paralysis of the insane.

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**Case of Dysphagia occurring in a Male, the Subject of Hemiplegia; Inflammation of Submaxillary Salivary Gland; Calculus in Wharton's Duct**—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—Male, aged 46, with remains of hemiplegia of left side of body and face, which occurred suddenly in the middle of last year; he has had great pain and inability to swallow solids for three weeks, with difficulty in opening the mouth. Peritonsillar region and larynx normal; there is dense induration and swelling in the left submaxillary region extending from the mandible to the larynx, suggestive of gumma; there is inflammation of the submaxillary salivary gland with salivary calculus felt in sublingual region. Extraction of the calculus and escape of a little mucopurulent fluid was followed by relief.

The PRESIDENT and Dr JAMES DONELAN referred to similar cases. After removal of the calculus the symptoms rapidly disappeared.

Sir JAMES DUNDAS-GRANT (in reply) considered the concurrence of hemiplegia as a mere coincidence, not a causal connection. The difficulty in swallowing was suspected to be due to some extension of the nerve disease to the nerves controlling the pharynx.

**Case of Dysphonia approaching Aphonia, simulating Laryngeal Tuberculosis; probably Mucous Patches on Vocal Cords**—Sir JAMES DUNDAS-GRANT.—A middle-aged man with almost complete loss of voice was suspected of being tuberculous; the lungs were found normal; no tubercle bacilli in sputum obtained by provoked cough; the laryngoscope revealed greyish opalescent patches on the anterior two-thirds of the vocal cords, probably of the nature of *plaques muqueuses*; Wassermann test negative.

Mr TILLEY referred to a case he had shown before the Section about six years ago, a male with two small lenticular plaques on the anterior third of each cord. There was no history of syphilis, and iodide of potassium and mercury had no effect upon the condition. Sir St Clair Thomson had suggested it might be tuberculosis, but he did not think that could be seriously maintained, because the man was in such robust health, and he had no symptom except slight hoarseness.

Mr HARMER regarded the patient as an ordinary carrier; there were a number of people who could be so described, *i.e.*, they carried influenza, or pneumococcus or streptococcus. This man said that, for the first time, he had been subject to a very explosive, spasmodic cough, which came on without warning. This was very typical of these carrier cases, who were subject to laryngeal changes of the type here seen.

Dr BROWN KELLY said the appearances were to him reminiscent of a fibrinous deposit on an ulcerated surface, such as he had seen in men during the War, who had laryngitis from gas, shouting, etc.; it covered the anterior two-thirds of the vocal cords, and gradually disappeared. Similar appearances might be due to influenza, and he asked whether this patient had had influenza, but the reply was in the negative.

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Sir JAMES DUNDAS-GRANT referred to four conditions which might produce a similar appearance. First, mucous plaques of syphilis ; secondly, the laryngitis produced by gassing. It was so long since this man could have been exposed to anything of that kind, that it was not likely to have been the cause in this case. The third was tuberculosis : and fourthly, chronic laryngitis with superimposed pachydermia. In the present case he did not doubt the cause was syphilitic, in spite of the negative Wassermann reaction ; the man in fact admitted he had had primary syphilis when in the army. It has almost disappeared under iodide of potassium.

**Endothelioma of the Larynx**.—WALTER HOWARTH, F.R.C.S.—Female, aged 40, seen May 1921, with history of hoarseness for two years. Laryngeal examination showed a smooth red swelling occupying the anterior two-thirds of the left ventricular band, and completely hiding the left vocal cord. It was thought that it might be a lipoma. When examined by the direct method it was found to be more extensive than was at first thought, and the cord was found to be fixed. Laryngo-fissure, June 1921. The tumour, including the whole of the left ventricular band and vocal cord, and one-third of the ventricular band and vocal cord on right side was removed. Bleeding was very violent and made the operation difficult. Uninterrupted recovery.

The PRESIDENT said Mr Howarth was to be congratulated on showing what he (the President) believed to be a unique case. He had seen a case of endothelioma of the nasopharynx, but not in the larynx. In his case, that of a lady, he had been watching the condition for four and a half years. When first seen he removed a portion of the growth for microscopical examination and again on five other occasions ; and the opinion of different people in each instance was endothelioma. Patient was doing quite well, and the lesion gave remarkably little trouble.

Dr W. HILL remarked on the small amount of deformity seen after such an extensive operation for malignant disease. Malignant endolaryngeal tumours were very uncommon in women.

Dr IRWIN MOORE said he thought this case would prove to be unique. He had searched through the entire literature of malignant growths of the larynx up to 1919 for his Monograph on Intrinsic Cancer of the Larynx, and he could find no record of a similar case.

Mr F. H. DIGGLE said that a mixed tumour—endothelioma—of the larynx, a subglottic growth, had been recorded in 1920 from the Mayo Clinic, by Dr G. B. New.

Mr HOWARTH (in reply) said he was much indebted to Professor Shattock for his very exhaustive examination and description of the tumour. In his search through the literature—not an absolutely thorough one—he had been unable to find the record of a similar case.

Professor SHATTOCK reports :—"The tumour consists of voluminous compact masses of cells, the peripheral elements of which are subcolumnar and have a palisade arrangement. In the midst of the cell masses there is

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a conspicuous number of capillaries, the tumour cells around which are likewise of the palisade kind. The capillaries are everywhere invested with a small amount of connective tissue, which excludes a diagnosis of perithelioma. The neoplasm may be regarded as a carcinoma arising from the investing epithelium, and of the basal-celled or non-squamosal variety. Many intact mucous glands occur in the section."

**Sarcoma of Ethmoid and Antrum**—WALTER HOWARTH, F.R.C.S.—Child, aged 9, with three months' history of swelling of nose and difficulty in breathing at night. There is a diffuse firm swelling on left side of the nose, and intranasally a large ragged polypoid growth that bleeds easily. There are stony-hard lumps at the angles of the jaw and on the right side of the neck.

Mr F. H. DIGGLE considered that the growth involved the septum and might even have arisen on the left side of the septum.

Mr TILLEY considered that the growth probably arose from the left ethmoidal region, ulcerated through the septum, and was now showing itself in the right fossa. One of the early signs of the disease had been a watering of the left eye. He recommended deep penetration with X-rays. He had seen a gentleman in October 1921 with the same condition; epiphora, an anæsthetic condition over the left cheek, and in the left nasal cavity a red vascular growth which bled easily. There was lancinating pain, great deafness and tinnitus in the left ear. The X-rays were applied in October, and when he saw the patient a fortnight ago he was astonished to find an apparently normal left nasal cavity, a complete disappearance of the proptosis and good nasal respiration. But he then had a hard mass of glands under the right sternomastoid (the primary trouble having been on the left), therefore he arranged for a further irradiation of this mass. This had now certainly disappeared for the time being.

Mr NORMAN PATTERSON inquired whether microscopical examination had been made of the growth in this case, also in that recorded by Mr Tilley, and remarked that X-ray or radium treatment were much more effective in sarcoma or endothelioma than in carcinoma.

Mr WOODMAN suggested that the growth originated from the septum. The left antrum was dull to X-rays and to transillumination; did it contain pus, or growth? It was very unusual for a growth starting in the antrum or the ethmoid to perforate through the septum, except in the upper region of the septum or in the sphenoidal region. He could recall five cases in which the growth began in the septum and spread centrifugally, growing upwards and downwards. There was an indefinite microscopical report of mild malignancy. He suggested there was need for pathological investigation of these nasal tumours, so that laryngologists could have a clearer idea of their nature and the prognosis in such cases. Probably this condition would clear up under radium.

The PRESIDENT said all would agree as to variations in the degree of malignancy in these growths: some were very malignant, others semi-malignant, while a third group was very innocent in its clinical course.

Dr W. HILL thought it was too much to say that intensive irradiation was the only hopeful treatment for such cases; surely Mr Tilley had seen

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good results from radium in these growths; in fact the more malignant the better the result. But radium did not act well in granuloma. He would employ both radium and the X-rays.

Mr LESLIE POWELL had seen a similar case, that of a small boy, who had a large swelling of his cheek, bulging into the palate; there was also proptosis. Operative treatment had no effect, but after X-ray treatment all signs of growth disappeared for eighteen months, when there was some recurrence. He had since lost sight of the patient.

Mr W. M. MOLLISON thought the growth was more septal than ethmoidal, as there was no thickening of the bridge of the nose. He had seen sarcoma of the ethmoid produce some displacement of the eye, and much more swelling in the orbit than on the bridge of the nose.

The PRESIDENT remarked that no reference had been made to Coley's fluid. The speaker's own experience was limited to three cases. In two it made no difference, but in the third improvement occurred, though it did not cause disappearance of the growth. In the present case he thought every modern method should be combined, and he suggested that Mr Howarth should first try Coley's fluid and if it failed then cross-fire treatment by both radium and X-rays.

Mr HOWARTH replied that he proposed to rely on radium in this case, applying two pieces intranasally, and one piece outside. He would report later.

**Papilloma of Cheek and Palate treated by Diathermic Cauterisation**—WALTER HOWARTH, F.R.C.S.—Male, aged 40. When first seen two years ago, there was a diffuse papillomatous condition of the inside of the left cheek, floor of mouth, and palate; this has been treated on three occasions and completely disappeared. At the present time there is a small recurrence, which it is proposed to treat on similar lines.

The PRESIDENT suspected malignancy in this case, though originally it was probably papilloma. He did not like the hard elevated look of the edge, nor the deposition of white horny epithelium inside the mouth. He remembered a case which was treated as an innocent condition—as it probably was at that stage—but became malignant, and caused very great infiltration and enlargement of the glands of the neck, and proved fatal.

Sir JAMES DUNDAS-GRANT said he was reminded of an earlier stage of a case which he showed before the Section two meetings ago, that of an elderly Frenchman, who had ulceration on the left side of the fauces and left cheek. Patient had been treated by X-rays, but he was going downhill: he was a heavy cigarette smoker. The present case, he strongly suspected, would eventually prove to be malignant.

Mr HOWARTH replied that this case was referred to him by Sir Cuthbert Wallace two years ago, and when he (Mr Howarth), first saw the patient, the whole left side of the mouth, soft palate, lips, and floor of the mouth were covered with whitish growth, of which a small portion could still be seen. The pathologist reported that it was papilloma. It had practically all disappeared under light diathermic cauterisation. The last



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treatment was given six months ago, and the present condition had appeared only recently. He proposed again to apply diathermy, but in view of the President's opinion, he would also remove a portion from the growing edge, and report later.

**Double Abductor Paralysis**—WALTER HOWARTH, F.R.C.S.—Male, aged 25. The condition was discovered when the patient was anaesthetised for an operation on the nasal septum: considerable stridor was noticed, and direct laryngoscopy revealed the present condition. The history is indefinite, but it would appear that alteration of voice and noisy breathing at night have been noticed for at least eighteen months. It is suggested that a bulbar lesion is probable. The Wassermann reaction is negative.

The PRESIDENT regarded this as a post-diphtheritic condition.

Mr F. H. DIGGLE said the boy had no trouble with his throat until he had influenza; he then had difficulty in breathing, which suggested a post-influenzal neuritis.

Dr P. WATSON-WILLIAMS thought there might be here a diphtheritic or some other infection, and it was not always possible to exclude the former. Some cases reported as paralysis, following streptococcal infection, were probably due to the Klebs-Loeffler bacillus in an undiagnosed diphtheria. As to whether it was a bulbar lesion, one often obtained valuable information from noting whether there was a persistent frequency of the pulse; if there was a bulbar degenerative lesion, the cardio-inhibitory bulbar nuclei were often involved.

Sir JAMES DUNDAS-GRANT elicited from the patient that earlier in the case-history the stridor was more marked than now, and that that might have been when only the abductors were involved, in accordance with Semon's law. At present the adductors were probably enfeebled, and the boy might be approaching a state of complete recurrent paralysis, or else the condition was subsiding. At present the breathing was fairly comfortable.

Dr DONELAN doubted whether there was complete abductor paralysis. There was considerable movement of the cords, and a fair breathing space. Some paralysis of the palate was present, as shown by regurgitation, and there seemed to be subglottic thickening, which probably supervened on an inflammatory condition.

Mr H. V. FORSTER said that a few days ago he had seen a boy who complained of stridor, and some abductor paralysis was apparently present. Tracheoscopy showed a "scabbard trachea," due to lateral pressure of an enlarged thyroid, which, however, had not been noticed externally. The trachea could be dilated by the examining tube, and the carina viewed.

Dr KELSON said the case seemed to him to be one of post-influenzal paralysis getting well. The boy was very clear about it having come on after influenza. Many years ago, he showed a similar case which followed influenza.

Mr PHILIP FRANKLIN said that he had recently seen a case of bilateral abductor paralysis, following an attack of influenza. The condition improved and the larynx again became normal.

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Mr HOWARTH replied that he would have liked to think this condition was influenzal. But it was ascertained that the influenza occurred last August, whereas the stridor had been noticed as far back as the preceding February. The reason he thought it might be a congenital syphilitic lesion, was that the teeth seemed almost typically syphilitic. He thought it was double abductor paralysis, which was proceeding to complete paralysis, and if that occurred there would be no need for tracheotomy.

**Suction Apparatus for Use in Nose and Throat Operations : Demonstration**—C. K. MOSELEY.—This little suction pump is designed on the rotary principle, and it has the valuable new feature that it is directly attached to a small motor of  $\frac{1}{30}$  h.p., which can be supplied to work from any electric lamp socket and for any voltage.

Dr SHIPWAY said he had been using the Sorensen suction apparatus for several months, chiefly with Mr Mollison ; it kept the area of operation clear of blood, mucus, etc., and at the same time delivered a stream of anæsthetic vapour. He had found the apparatus of much value, and thought the method represented a great advance in this special branch of surgery.

Mr W. M. MOLLISON confirmed all that Dr Shipway said about the American apparatus. Mr Moseley's apparatus was neater and less noisy than the American product, but the Sorensen apparatus was more powerful and delivered the anæsthetic at the same time. Dr Shipway had had a device fitted to his which rendered it quieter in working. It had proved most useful in tonsil operations ; no blood escaped down the throat, and it supplied an almost dry field, and thus made enucleation easier and quicker. By means of a narrow tube it could be used in nasal operations. He had also used it for mastoid operations, the tube being held at the bottom of the cavity, leaving the operator free to operate without the necessity of constant swabbing. It was also very valuable in bronchoscopy.

Dr DONELAN said the Moseley turbine apparatus was not so powerful as the Sorensen, and he suggested that an increase in the number of blades would give greater power. He hoped its employment during tonsillectomy would not deter members from picking up and ligaturing bleeding points in the tonsillar fossa.

Mr MOSELEY (in reply) said no trouble had been experienced in sucking up blood clots in the bottle. To facilitate removal it was well to suck up a little saline solution first. In the case of a soft foreign body lodged in a bronchus, the suction apparatus could be so arranged that it would suck the body out, without the intervention of forceps.

**Sarcoma of Lower Pharynx treated by X-rays ; Disappearance of the Growth**—DAN M'KENZIE, M.D.—Male, aged 66, was first seen 19th September 1921 complaining of a hard painful swelling on the right side of the oral pharynx, which he had discovered fourteen days previously. The vocal cords were seen moving normally, but at the end of October hoarseness set in, and early in November the right cord was seen to be fixed in abduction, while the right

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arytenoid was swollen, and there was visible a swelling on the right lateral wall of the pharynx about the level of the upper orifice of the larynx and extending downwards. On 8th November, portions of this tumour, removed by the direct method, showed "all the histology of a large round-celled sarcoma."

Patient has been under X-ray treatment by Dr Robert Knox at the Cancer Hospital, and has had five exposures.

On 23rd January 1922, examination of the larynx showed that the cords were moving normally; the arytenoid swelling had disappeared and the tumour on the right side of the laryngo-pharynx, from which the pieces were taken for examination, was no longer visible.

**Specimen of Cyst of Tonsil**—T. JEFFERSON FAULDER, F.R.C.S. —From a female patient, aged 45, who suffered periodically from dysphagia. The cyst projected from the upper pole of the left tonsil. It had a translucent appearance. It varied in size from time to time, sometimes being so large as to displace the uvula and soft palate.

## ABSTRACTS

### PERORAL ENDOSCOPY

*Cicatricial Laryngopharyngeal Diaphragm.* G. B. NEW, M.D., and P. P. VINSON, M.D., Mayo Clinic. (*Journ. Amer. Med. Assoc.*, Vol. lxxvi., No. 15, 9th April 1921.)

The case is one of cicatricial pharyngeal diaphragm of the laryngopharynx, with strictures of the cesophagus caused by swallowing lye. Man, aged 28, complained of inability to swallow or to breathe through the pharynx; he was wearing both a tracheotomy and a gastrostomy tube. He asserted that he had been perfectly well until two years before at which time while walking in his sleep he drank a solution of lye. About ten days after having taken the solution, he began to have difficulty in swallowing. The cesophagus became closed completely and there was increasing difficulty in breathing. Tracheotomy and gastrostomy were performed. Examination of the patient showed a scarred diaphragm joining the base of the tongue around the region of the epiglottis to the posterior pharyngeal wall; there was a small opening just to the right of the middle line close to the posterior pharyngeal wall which admitted a small probe. The diaphragm was quite thin; a bent probe could be passed in all directions from the small opening.

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By means of laryngeal suspension under ether, a circular piece was removed from the diaphragm with a knife, so that the larynx and œsophagus could be viewed directly. The following morning the patient could eat oatmeal and cork the tracheotomy tube. Three months after laryngeal suspension he contracted influenza, followed by empyema, which required tubal drainage. As he convalesced from the empyema, the tracheotomy tube was removed, and then the gastrostomy tube, and finally the empyema cleared up completely. The patient was treating the pharyngeal stricture by dilating it with the index finger; the œsophageal strictures are being dilated from time to time by sounds, a previously swallowed silk thread being used as a guide.

The interesting points in the case are :—

- (1) The laryngopharyngeal stricture was the result of swallowing lye.
- (2) The patient earned his living for two years while he wore a tracheotomy tube and a gastrostomy tube, feeding himself by means of chewing food and spitting it into the gastrostomy tube funnel.
- (3) At one time he carried three tubes, tracheotomy, gastrostomy, and empyema, and ultimately was able to get along without any of them, and is now following his vocation.

PERRY GOLDSMITH.

EAR.

*Multiple Otogenic Intracranial Lesions.* HOLGER MYGIND.  
(*Zeitschr. f. Ohrenheilk*, 81 Bd., 4 Heft, 1921.)

In this paper notes of 207 patients suffering from otogenic intracranial complications are analysed. They include 141 cases of meningitis, 106 of sinus phlebitis, 42 of brain abscess, and 19 of subdural abscess. Solitary complications occurred 134 times with 45 per cent. recovery, 2 simultaneous complications 50 times with 24 per cent. recovery, 3 complications 16 times with 12 per cent. recovery, and 4 complications 73 times with 19 per cent. recovery. Of the solitary cases, if all those with extradural abscess are excluded, there were 76, and of these 28 per cent. recovered. This high death rate in the solitary cases is due for the most part to rapidly progressing meningitis, in which there was no time for other complications to develop. The percentage of cures, then, for all the intracranial complications was 36 per cent., and for the solitary forms 45 per cent. (meningitis 18 per cent., sinus thrombosis 79 per cent.), and for the multiple forms 19 per cent.

With regard to age incidence, the group from 5 to 14 years is by far the greatest. The prognosis is best in this group also. There was not a single case of multiple complications under the age of 5 or over 30 which recovered.

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*Frequency of Occurrence of Various Conditions.*—Meningitis cases were 68 per cent. of the total, sinus phlebitis 50 per cent., brain abscess 20 per cent., and subdural abscess 9 per cent. Solitary complications occurred in 65 per cent. of the cases, and multiple in 35 per cent. Brain abscess and subdural abscess are more likely to be associated with other complications than meningitis and sinus phlebitis, which tend to occur alone.

*Causes.*—In the solitary cases acute middle ear suppuration was the cause in 46 per cent., while in the multiple cases it was the cause in only 34 per cent. Cholesteatoma was present in one-fifth of the solitary cases and in one-third of the multiple cases. Out of 40 multiple cases in which brain abscess was present, 33 or 83 per cent. were due to chronic middle-ear suppuration, and of these 33, 14 were associated with cholesteatoma. In the uncomplicated meningeal cases, on the other hand, the proportion of acute middle-ear suppuration to chronic was 4 to 3.

When meningitis and sinus thrombosis are associated the meningitis is almost never primary. Out of 25 cases the meningitis was undoubtedly secondary in only 6. These were all fatal. Secondary meningitis begins from four days to seven weeks after the sinus thrombosis has been seen at operation. Death usually occurs in a few days from the time of onset. A second group in which the meningitis and the thrombosis occurred simultaneously differed from the first group in that only 10 of the 19 died. Nine of these fatal cases followed acute middle-ear suppuration. Optic neuritis did not occur in any of the fatal cases. In 3 of the fatal cases of meningitis the cerebro-spinal fluid became clear shortly before death.

With regard to the diagnosis of meningitis Mygind lays special stress on the results of lumbar puncture, although the fluid may not show definite changes till one or two days after the onset of the meningitis. The sign which he regards as most characteristic of meningitis is a pleocytosis, or increase in the number of cells, whether polymorph or mononuclear.

Optic neuritis was present in only 3 out of 16 cases of brain abscess and meningitis, while in the remaining 40 cases of brain abscess with all other complications, 12 or 30 per cent. had optic neuritis.

Multiple brain abscesses were not common in this series, being present in only 5 out of 42 cases. The mortality of the brain abscess cases was high, only 10 per cent. recovery. However, 10 cases were only discovered post mortem, and 3 others were not operated on for various reasons. Of the remaining cases 14 per cent. recovered. The undiscovered abscesses were all either small and giving rise to few symptoms, or the symptoms were obscured by other complications.

J. K. MILNE DICKIE.

## Abstracts

*Remarks on Sinus Phlebitis and Thrombosis complicating Suppurative Middle-Ear Disease.* J. P. I. HARTY. (*The Bristol Medico-Chirurgical Journal*, September 1921.)

The author gives clinical records of 9 cases. Of these, 5 recovered and 4 died, deaths being due to septicæmia, meningitis, cavernous sinus thrombosis, and pyæmia, respectively. Three of the cases resulted from acute and the remainder from chronic otitis media. Three of the cases presented points of particular interest. In the first an acute otitis media developed in a boy aged 8 years, three days after an operation for the removal of tonsils and adenoids. An extensive mastoid suppuration of von Bezold's type was present on the seventh day after the tonsil and adenoid operation. Immediate operation disclosed a large perisinus abscess with thrombosis of the lateral sinus. Death occurred ten days later from septicæmia, confirmed by post-mortem examination. In another case, a male aged 45, with history of previous otorrhœa, when the sinus thrombosis occurred the suppuration in the middle ear had cleared up and the membrane was intact, although at the operation suppuration was present in the mastoid process. The third case, a male aged 3 months, presented a double acute otitis media of recent origin. A large subperiosteal abscess was opened and the antrum exposed on the left side. Twenty-four hours later œdema of the face with proptosis on the right side developed with symptoms of meningitis. Post-mortem showed a necrosis of practically the whole of the right petrous bone with thrombosis of the lateral, superior and inferior petrosal, and cavernous sinuses on the right side with basal meningitis. The left, or operated, side was apparently healthy. The author lays stress on the fact that infection of the mastoid process should be regarded as similar in nature to an osteomyelitis in other regions and not as a distinct entity. Venous infection is especially prone to occur owing to the large size of the venous radicles and their very short course before entering a large venous sinus. The fact that a healthy sigmoid sinus may lie above a thrombus of the jugular bulb may lead to misleading results when the sinus is explored with a syringe. The author also details various possible pathways of infection from middle ear or mastoid cells to the venous sinuses.

A. J. WRIGHT.

*The Lymph System of the Labyrinth.* ALEXANDER REJTÖ,  
Budapest. (*Monats. f. Ohrenh.*, Year 55, Vol. iv.)

The object of this article is to discuss the question as to whether there is a direct open connection between the meningeal fluid and the perilymph of the labyrinth, or in other words whether the aqueductus cochleæ contains a perilymphatic duct.

For the experimental physiologist the inner ear presents many

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difficulties. Schwalbe, whose methods the author employed, was the first to contend that as, in all those cases in which the cerebral pressure was raised, the pressure in the inner ear was also similarly affected, so a direct connection existed between the perilymph and meningeal fluid. Until now no one has questioned this assertion, but some doubt on this point in the author's mind led him to make further research.

After discussing the various fallacies which surround experiments hitherto carried out by the injection of mercury, coloured fluids, etc. (owing to their general infiltration and escape by other channels such as the Fallopian canal), the author comes provisionally to the conclusion that the balance of perilymph and endolymph of the inner ear depends on secretion and excretion in connection with the adjacent blood vessels—similar to the relationship of the meningeal fluid to the choroid flexus—and that it is thus quite superfluous to seek for any direct connection between the two systems, since they will both be equally affected by similar conditions of the blood circulation.

ALEXANDER TWEEDIE.

*A Double Sigmoid Portion of the Lateral Sinus.* J. M. BROWN.  
(*Laryngoscope*, Vol. xxxi., No. 8, p. 605.)

In 1914, Hahn studied the question of double lateral sinuses. He collected 13 cases, but only 1 of them had a double sigmoid. In the present specimen the sigmoid portion of the left lateral sinus was double, being separated by a ridge of bone with a distance between them of 8 mm. The length of the double portion was 4 cm. They united just as the jugular foramen was reached. The author quotes a summary of the development of the venous sinuses of the dura mater, and also supplies an ample bibliography.

ANDREW CAMPBELL.

*Facial Paralysis.* ALEXANDER GIBSON. (*Journal of Surgery, Gynecology, and Obstetrics*, 21st November 1921.)

After preliminary discussion on the Anatomy of the Facial Nerve and the disabilities resulting from seventh nerve paralysis, the writer discusses Etiology, and the cases are divided into three groups—(1) a simple neuritis resulting from cold, (2) as a result of acute or chronic otitis, and (3) traumatic—surgical or otherwise.

In the event of failure by electrical methods, operative treatment is indicated, and the author gives a historical survey of the various procedures. In his opinion operations for tendon or muscle transplantation should be limited to cases of partial paralysis or to those in which nerve anastomosis has definitely failed.

The writer prefers the Hypoglossal nerve to the Spinal Accessory

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and it should be sutured by an end-to-end anastomosis to the divided facial nerve. The finest silk only is used and only the neural sheaths united (he finds catgut too thick for such delicate anastomosis). Attention is called to the advisability of lifting up the parotid gland rather than cutting into its lobules in the search for the facial nerve.

The most interesting part of the paper lies in the analysis of the results to be obtained—which are encouraging. A return of muscle tonus to be followed more slowly by voluntary control is to be expected, but emotional movements of the face usually remain absent, and owing to the complexity of the cortical centre for the face this is only to be expected.

MUSGRAVE WOODMAN.

### NOSE AND ACCESSORY SINUSES.

*On Endonasal Operations of the Lachrymal Sac according to West.*

E. KNUTSON. (*Acta Oto-laryngologica*, Vol. iii., fasc. 1 to 2. Stockholm, 1921.)

The author has operated according to West in 61 cases of dacryostenosis and controlled the given result through re-examination. The longest period of observation has been two years five months, the shortest two months. The result, independent of the patient's subjective statements about recovery, has only been considered satisfactory when lachrymation towards the nose has been restored, demonstrable by positive fluoresceine test. A good result has been gained in about 80 per cent. of the whole number of cases operated on. Simple dacryostenosis and uncomplicated, catarrhal dacryocystitis have proceeded to healing with lastingly good function in 90 per cent. In cases of dacryostenosis, complicated by acute phlegmonous dacryocystitis, by cicatrices or fistulæ after such, a good result has only been arrived at in 55 to 60 per cent. The difference with regard to the effect of the operation cannot, in the author's opinion, be due to a faulty technique, as the unsuccessful cases appear as often towards the end of the series as in the beginning. It is more probable that a reduction in the contractile power of the canaliculi is the cause of the endonasal dacryorhinostomy being performed unsuccessfully.

AUTHOR'S ABSTRACT.

*Re-establishing Intranasal Drainage of the Lachrymal Sac.* Dr H. P. MOSHER. (*Laryngoscope*, Vol. xxxi., No. 7, p. 492.)

From his experience of twelve cases of intranasal dacryocystostomy, the author thinks that longer observation is necessary before pronouncing the case as cured. Lachrymation may return even three years after operation. One case in this series had a distended sac with much pus, and at the end of the operation the operator noticed



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that the orbital fat had been exposed. The orbit became infected and the patient had a long illness, very nearly losing the eye. In another case where paraffin had been injected to distend the sac and make it easier to find, an abscess developed in the lower lid. Owing to these unhappy results the author decided to try the operation performed by Toti ten years ago. After packing the nose with adrenalin gauze, ether is administered, the eye protected, and the anterior end of the middle turbinal removed. The incision, 7 mm. from the inner canthus, extends from the level of the crease in the upper eyelid to 2 or 3 mm. below the inner limit of the lower rim of orbit. The periosteum is elevated and the sac exposed from above. Its inner surface is freed from the bony inner boundary until the nasal duct is seen. An opening is made into the nose by breaking down the lachrymal bone in front of the lachrymal crest. With punch forceps the opening is enlarged anteriorly and inferiorly. The posterior edge of the ascending process of the superior maxilla is bitten off. The bony window must equal at least the height and width of the sac. The inner half of the sac is now removed, as also the inner part of the nasal duct. Toti makes openings in the mucous membrane of the nose and the sac and anastomoses them by sutures. Soft parts are replaced and sutured lightly, and a pressure pad applied. The nose is also packed from one to four days.

The immediate results have been good, and the scar, which is the only disadvantage, is not noticeable. A straight incision causes the least disfigurement. It is too early yet to say if the wide opening into the nose will solve the problem of intranasal drainage. The author is of opinion that the ophthalmologist as well as the rhinologist could do this operation and sees no reason why one should operate round the corner mostly by touch when it can be done by sight. It would be useful to have results of both types of operation after the lapse of three years, and also reports of any other cases where the eye has been infected as a result of the operation.

ANDREW CAMPBELL.

*Two Cases of Tumour of the Nasal Vestibule.* VICTOR FRÜHWALD, Vienna. (*Archive für Ohren-Nasen und Kehlkopfheilkunde*, Bd. 108, 1921.)

Under this title Dr Frühwald furnishes two interesting case reports, illustrated by photographs:—

CASE I.—A woman, aged 62, a snuff taker, had noticed a year previously a wart inside the right nostril. Five months afterwards, it began to grow rapidly, and gradually projected forwards over the upper lip. Two attempts to remove it were made; both followed by recurrence. At this stage the tumour implicated the tip, alæ, and

## Abstracts

septum of the nose. It showed necrotic clefts and a horny appearance at the root of the nose. Rhinitis sicca was present; the glands were not enlarged.

A radical operation was performed by Professor Chiari. Microscopically, horny formation of the epithelial cancer cells was the predominant feature. The patient died three hours after operation.

CASE II.—Female, aged 49. A wart had existed for a few years at the upper and inner corner of the right nostril.

After an injury, eight weeks previously, it grew rapidly. A warty growth of horny appearance projected from the nostril, blocking it completely, extending to the edge of the upper lip. Histologically the papillæ were composed of horny epithelial cells. The sharp basal demarcation and absence of mitoses justified the hope that the growth had not assumed malignant characteristics.

WM. OLIVER LODGE.

### *Contribution to the Pathology and the Treatment of Imperforate Choana.*

Prof. JACQUES, Nancy. (*L'Oto-rhino-laryngologie Internationale*, December 1921.)

The writer points out that this condition is probably not so rare as it is supposed to be, and he reflects on the mediocre results usually obtained from the operation. He suggests again that congenital syphilis may be the principal pathogenic factor. In a case cited the patient showed the usual facies of chronic nasal obstruction. Two operations had been performed for the removal of post-nasal adenoids, and the writer was consulted for advice as to a third operation. The condition was recognised by anterior rhinoscopy, and confirmed by digital examination under ethyl chloride. The posterior choana on the left side was imperforate.

The routine method of operating, by submucous resection, was discarded. A strong adenoid forceps was introduced by the mouth into the naso-pharynx, and a jaw of the forceps was pushed into each choana, a considerable bite being taken particularly on the obstructed side. A bite was now made, followed by a twisting movement of the forceps, and an orifice was left of about one square centimetre in area. The edges of this opening were trimmed, and a wick of iodoform gauze introduced and left for four days. The functional result was satisfactory.

GAVIN YOUNG.

### *Thrombosis of the Cavernous Sinus.* H. KEY-ÅBERG. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 and 2. Stockholm, 1921.)

The patient who died shortly after an operation for bilateral sphenoidal sinus disease complicated by thrombosis of the cavernous sinus and meningitis, showed during life an interesting symptom consist-

## Nose and Accessory Sinuses

ing of marked anæsthesia in the left supra and infra-orbital regions. The author attributes this symptom on anatomical grounds to the presence of the thrombus in the cavernous sinus, and considers that it is of value in distinguishing cases of this nature from those of oculo-orbital inflammation with increased intra-ocular pressure, in which an anæsthesia affecting simultaneously the areas of supply of the first and second branches of the trigeminal nerve is anatomically impossible.

THOMAS GUTHRIE.

*Some Points in the Diagnosis of Headaches and other Nervous Manifestations of Nasal Origin.* P. WATSON-WILLIAMS. (*Lancet*, 1922, Vol. i., p. 311.)

The writer considers headache first (as the dominant symptom in many nasal affections), the simplest case being that due to pressure between the septum and middle turbinate. Such pressure may be due to septum deflection or to recurrent turgescence of the middle turbinal, the latter very often caused by a sinusitis. Headache is also the result of trigeminal irritation from an inflamed or pus-filled sinus. Pain in such cases may be referred in maxillary sinusitis to the occiput, in ethmoidal or sphenoidal sinusitis to the supra-orbital, temporal, or post-ocular regions, or even to the middle ear or mastoid. Frontal headache may be due to affection of the frontal or sphenoidal sinus or to pressure from an enlarged turbinate. Toxic absorption from sinus empyema causes diffuse headache. Watson-Williams insists that, in sinus empyema the amount of pus in a nasal discharge is no criterion of its virulence, since the more the pus the less the toxæmia. It is the toxæmia of latent sinusitis that is its most important feature. It causes diffuse headache, mental depression, inability to concentrate, and loss of memory. In dealing with neurasthenic patients sinus infection should not be forgotten, for "these infected sinuses became perfect physiological culture-tubes, maintained at blood-heat with a never-failing pabulum." The foul odour in sinus suppuration may be a cause of olfactory illusion in the insane. The conditions frequently associated with a chronic sinus infection are enumerated in the conclusion as: headache or heaviness, recurring sore-throats, muscular rheumatism, rheumatoid arthritis, gastro-intestinal catarrh, and appendicitis.

MACLEOD YEARSLEY.

*Some Indications for Operation on the Nasal Sinuses in Children.* DEAN and ARMSTRONG. (*Laryngoscope*, Vol. xxxi., No. 5, p. 273.)

Three cases of multiple infective arthritis with severe crippling are described. The patients were between 8 and 13 years old, and were all referred to the clinic by the orthopædic surgeon. In all, tonsils and adenoids were removed with little benefit. Each case was

## Abstracts

treated in the hospital for some months, and examination of the nasal sinuses was most carefully carried out. A hæmolytic streptococcus was isolated. It was eventually necessary in all to open one or both sphenoidal sinuses before the arthritis ceased to progress. The authors are strongly against operative treatment of the sinuses in children. An examination of the sinuses of 1108 children was carried out. In the majority of diseased sinuses, a tonsil and adenoid operation was sufficient to effect a cure.

ANDREW CAMPBELL.

*The So-called Maxillary Sinusitis of Infants.* VERNIEUVE. (*Revue de Laryngologie, etc.*, September 1921.)

Two cases are recorded of septic osteitis of the superior maxilla in infants of five weeks and two months respectively. Both cases were preceded by an acute conjunctival infection.

The author is of the opinion that these cases are often wrongly ascribed to antral infections. Up to the time of eruption of the first molar tooth the antrum is rudimentary, consisting only of a small pit almost filled with thick mucous membrane, at the bottom of the middle fossa. On the other hand the superior maxilla is solid though spongy in texture, and when infected, a general osteitis of the whole bone readily occurs. The path of infection is rarely *via* the rudimentary antrum, and not often *via* the dental sacs, which are closed cavities until the teeth have erupted. He believes an infected lachrymal sac is a common starting-point of the osteitis. At birth the nasal duct is closed by a membrane at its lower end, which becomes permeable at a period after birth varying from a few days to a few months. The duct being filled with secretion, and closed at its lower end, spread of infection to the substance of the bone is favoured.

G. WILKINSON.

## MISCELLANEOUS.

*Post-graduate Work in Laryngology.* ROSS HALL SKILLERN, M.D. Philadelphia. (*Journ. Amer. Med. Assoc.*, Vol. lxxvii, No. 18, 8th October 1921.)

Owing to the lack of general knowledge of Oto-laryngology the young surgeon attending any of the post-graduate courses in the United States seems to believe that the septum and tonsil operations constitute the alpha and omega of Oto-laryngology. His assurance on this point is more firmly impressed on him by his whole hospital experience. This attitude must be combated, and when successful, the six weeks' course will forever disappear. The University of Pennsylvania purposes to extol the wideness of the scope of Oto-

## Miscellaneous

laryngology, and insists on adequate preparation which will awaken the student to the possibilities instead of being held down by his limitations (*i.e.*, tonsils and septum). The University decided that the six weeks' course would for them be a thing of the past, and for the Session 1919 to 1920, two courses, each of four months' duration, limited to sixteen students, would be offered. So large was the number of applicants, that after the first semester had been completed the Faculty proposed that the length of the course should be increased to one full academic year. This course included lectures in surgical anatomy of the nose, accessory sinuses, and larynx, surgery of the nose and accessory sinuses, neurology, physiology of the ear, of the pharynx and larynx, bacteriology, operations on the cadaver and broncho-œsophagoscopy. These were all given in the morning hours, while the afternoons were devoted to clinical work, particularly operative, in which the student took an active part. The course, limited to twenty men, was immediately filled.

An effort, too, is soon to be made to supply refresher courses to active specialists whose sphere of activity does not afford them sufficient opportunity to become acquainted with the practical application of the newer procedures.

PERRY GOLDSMITH.

### *Surgery versus Roentgen Ray in the Treatment of Hyperthyroidism.*

GEORGE W. CRILE, M.D., Cleveland. (*Journ. Amer. Med. Assoc.*, Vol. lxxvii, No. 17, 22nd October 1921.)

Hyperthyroidism (C. H. Mayo) seems a more fitting name for a disease whose chief characteristic is a supernormal activity of the thyroid gland than does exophthalmic goitre, a term which signifies but one of the features of this complex syndrome.

Some 239 drugs and other methods of treatment have been collected by Marine as curative, but only two methods of treatment are considered by Crile as worthy of consideration—surgery and roentgen ray. A careful study of literature reporting favourably on roentgen-ray treatment does not convince the author that it is as permanently valuable as its sponsors believe, and he shows by his own records that surgery combined with physiological rest offers a greater likelihood of favourable results. Hitherto the only valid objection to surgical treatment has been the mortality; but now in Crile's practice, surgical treatment is undertaken in every case, the mortality is practically eliminated, much time is saved and more certain cure is achieved. In his last series of 227 consecutive thyroidectomies, and 180 consecutive ligations, that is, 407 consecutive operations for hyperthyroidism, were performed without a death.

PERRY GOLDSMITH.

## Abstracts

*The Substitution of the Term "Tuberculous Diverticulum" in place of "Traction Diverticulum," based upon the Pathogenesis of the Affection.* JENS KRAGH. (From the Pathological-anatomical Institute of the University of Copenhagen, 1921.)

Rokitansky was the first to describe a case of traction diverticulum, but the term was originated by Zenker. Ribbert, in *Virchow's Archiv*, called attention to these affections: he tried to ascribe their origin to a congenital disposition, and not, as had been hitherto maintained, to a traction from lymphatic glands which had undergone pathological changes. The congenital disposition, according to Ribbert, consisted in an incomplete closure of the communication between the œsophagus and trachea during foetal life. The theory of Ribbert has been opposed by Hausmann, Riebold, and Brosch.

Kragh has paid special attention to the question: he has investigated the following points:—

- (1) Do systematic post-mortem examinations of human beings reveal adhesions between lymphatic glands and the œsophagus?
- (2) If so, what pathological processes give rise to such adhesions?
- (3) Is it possible, in these adhesions, to follow systematically the mechanism of their origin?
- (4) Finally, for purposes of comparison, he has examined numerous traction diverticula by means of serial sections.

On examining systematically 556 individuals after death, he found 14 cases (2 per cent.) of adhesions between lymphatic glands and œsophagus. In all, the glands in question presented tuberculous changes (fresh or old).

*Group I.* comprised the great majority of the cases and was characterised by fresh inflammation in the wall of the œsophagus. *Group II.* represented the minor part of the cases and was characterised by cicatricial formation in the wall of the œsophagus.

The conclusions reached were, that tuberculosis of the lymphatic glands gives rise to adhesion between them and the œsophagus, and that in the recent inflammation of the wall of the œsophagus the following stages can be distinguished: (1) round-celled infiltration, (2) typical tuberculous inflammation, which (3) may be associated with necrosis and perforation of the wall. Furthermore, that the healing takes place by (1) formation of a cicatrix, (2) retraction of the margins of the wall round the cicatrix, and (3) by proliferative growth of the epithelium into the canal of the perforation in cases where perforation has taken place.

Fifty-one traction diverticula were examined by means of serial sections. In nearly all cases the diverticula were found to adhere

## Reviews of Books

to lymphatic glands which had undergone a diminution owing to contraction, and which nearly always showed unquestionable signs of fresh or old tuberculosis. Also in the few cases where tuberculosis could not be detected, the pathological structure was not incompatible with a tuberculous origin.

The traction diverticula most frequently occur below the bifurcation of the trachea, and then, in most cases, to the right of the median line of the œsophagus. A considerable number, however, are situated superior to the bifurcation, and then nearly always to the left of the median line. The majority of the glands inferior to the bifurcation are placed at the lower side of the right main bronchus. Consequently, inflammatory processes from these glands will pass to the œsophagus to the right of the median line: above the bifurcation the right glands are separated from the œsophagus, whereas the left glands are situated near the gullet.

It is generally known that traction diverticula may only in few cases give clinical symptoms. It has been stated that traction diverticula have sometimes caused development of carcinoma. For this reason 40 cases of carcinoma of the œsophagus were examined, and in 4 only had cancer taken rise from a traction diverticulum. This may have been the case in other instances in which very extensive destruction prevented a decisive microscopical examination.

The traction diverticulum may be considered a rather important factor in the etiology of cancer of the œsophagus.

A. LOGAN TURNER.

## REVIEWS OF BOOKS

*Intrinsic Cancer of the Larynx and the Operation of Laryngo-fissure.*

IRWIN MOORE, M.B., C.M., Edin. London: University of London Press, 1921.

This excellent monograph will be welcomed by all laryngologists as the work of one who has devoted much thought and labour to the subject-matter. It is of special interest to British laryngology, as it is largely due to the patient, unremitting work of Durham, Butlin, Semon, and St Clair Thomson that the last named was able to report early in 1919 a series of thirty-eight cases of intrinsic cancer of the larynx healed by laryngo-fissure with only one death—a success hardly equalled in the surgery of malignant disease.

In his historical account of the operation Dr Irwin Moore brings

## Reviews of Books

out very clearly the various stages in its evolution, and emphasises the fact that success has gone along the lines of earlier diagnosis of the disease and improvement in operative technique. In the latter Dr Moore has taken a prominent part in developing the instrumentarium, and we have in the work a résumé of his experience "in performing or co-operating" in over fifty cases of laryngo-fissure. The description of the operation is therefore all that can be desired—well illustrated, so that it can be easily followed, and full of practical detail. The chapters on resection of the growth and post-operative hæmorrhage are especially good. A valuable feature of the book is a copious bibliography.

Dr Moore has done well to set out clearly the importance of early diagnosis in this insidious disease and the significance of persistent hoarseness as a symptom. He quotes the opinion of an authority to the effect that for late recognition the fault lies at the door of the general practitioner, who does not take sufficient notice of early symptoms; but it is a common experience that patients, at least of the hospital class, do not seek advice until the disease is well advanced. We are not quite convinced of the value of legislative protection which Dr Moore is anxious to extend to "the uneducated and credulous public," who treat their throat ailments through advertisements in the lay press. It would, perhaps, be a counsel of perfection to urge that patients of middle age, with hoarseness of six weeks' standing, should undergo a laryngoscopic examination, for many might doubtless feel happier if Manuel Garcia had been strangled in his cradle. The true way is to enlist the co-operation of the general practitioner, who is, after all, the main channel for enlightenment of the public, and we regard Dr Moore's excellent book as a finger-post in that direction.

D. R. PATERSON.

*Handbuch der Ärztlichen Erfahrungen im Weltkriege, 1914 to 1918.*

Band VI. Gehörorgan, Obere Luft und Speisewege. Edited by OTTO VOSS and GUSTAV KILLIAN. Leipzig: Johann Ambrosius Barth, 1921.

This volume, dealing with the ear and upper air and food passages, is the sixth of a series of nine, which, under the general editorship of Professor Otto von Schjerning, represents the medical and surgical experience in the Great War from the German point of view. The volume under review is the work of the two editors, Professors Voss and Killian, together with a number of other oto-laryngologists, such as von Eicken, Kahler, Gutzmann, and Stenger, whose names are well known in this country. The book comprises 341 large pages of text and includes an index and upwards of 80 illustrations.

The first portion, which deals with the ear, contains besides sections



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on the injuries and organic diseases of the organ resulting from military service, chapters also on the functional diseases, aggravation and simulation and the reciprocal relationships between old disease and war injuries.

In the second portion the first five chapters are concerned with the injuries of the nose and throat, together with the accessory sinuses, trachea, and œsophagus, while the last two chapters deal with injuries of the nerves supplying the upper air and food passages, and the disturbances of voice and speech occurring in the wounded.

Rupture of the tympanic membrane was of such frequency as to have constituted as much as 6.4 per cent. of the total war injuries; and among injuries of the organ of hearing itself it held the second place, being surpassed only by damage to the inner ear. It was met with in powerful concussion of the cranial bones without any demonstrable lesion in the neighbourhood of the ear, while severe gunshot wounds with extensive destruction of bone close to the ear were sometimes unaccompanied by any damage to the membrane.

Abscess of the brain proved to be much more frequent after gunshot wounds of the accessory sinuses than was expected in the early days of the war. It was found in 30 per cent. of 150 autopsies on cases of this nature, while it occurred in 5 per cent. of 200 who recovered. Probably the latter figure is too small, as, owing to its characteristically symptomless course it would, in some cases, not become evident until long after the patient had passed out of the original observer's care. In one case of Weingaertner's the abscess remained latent for two and a half years. The manifest stage usually begins suddenly, and often apparently as a result of some other infection such as pneumonia. In the absence of early evacuation, either spontaneous or operative, rupture into the ventricle and meningitis follow very rapidly, and the manifest is often also the terminal stage.

Killian lays stress on the value of the X-rays in gunshot wounds of the larynx, both in order to disclose small particles of metal, and also to determine the nature of the damage to the thyroid and cricoid cartilages, and alterations of the lumen of larynx and trachea.

Disturbances of speech and voice are dealt with by Gutzmann in a long and interesting chapter, his observations being based on a material of over 1000 cases. He describes in detail his methods of re-education, and gives a large number of case histories.

It may be of interest to note that the large portion of the volume for which Professor Killian was responsible both as editor and author, represented his last contribution to medical literature. He died on the 24th of February 1921, after having almost completed the revision and correction of the manuscripts.

THOMAS GUTHRIE.

## LETTERS TO THE EDITORS

TO THE EDITORS,

*The Journal of Laryngology.*

SIRS,—In a letter which appears in the January number of the Journal, I ventured to criticise some remarks in an article in the November number by Dr Chevalier Jackson, in which he called in question the value of lower as opposed to upper bronchoscopy for removal of foreign bodies even in infants.

In the course of an interesting paper in the March number of the Journal, Dr Richmond M'Kinney mentions the cases of two infants of two years in each of which a "Lima Bean" had been inhaled into the trachea. In the first, much anxiety arose during attempted removal *per vias naturales*, owing to the bean becoming momentarily impacted in the larynx and causing complete obstruction; while in the second case, passage of the bronchoscope through the larynx was followed by impaction of the much swollen bean across the lower end of the trachea, with resulting death from asphyxia.

It is not clear to me that the risks of such accidents would, as Dr M'Kinney seems to suggest, be greatly reduced by the avoidance of general anaesthesia, but the cases do seem to illustrate very forcibly the great advantage, in such conditions, of inferior as opposed to superior bronchoscopy. The presence of a tracheotomy opening in the first case would have avoided any anxiety from laryngeal obstruction; and, in the second case, might well have prevented the fatal result, owing to the ease and rapidity with which a foreign body can be removed from the lower end of the trachea by means of a comparatively wide and short tube passed through a tracheotomy opening.—I am, etc.,

THOMAS GUTHRIE.

DEAR SIRS,—I shall be obliged if you will afford me a little space in which to reply to Mr Mark Hovell's letter in your February issue. If Mr Hovell will refer to my first letter, he will find that I did not say that enucleation was "justifiable merely because the tonsil is fixed by adhesions to the pillars": I was discussing the choice between enucleation with the guillotine and by dissection, and stated that, in my opinion, the dissection operation should be reserved for tonsils which cannot be removed entirely with the guillotine, including among others, those fixed by adhesions. I am glad to find that we agree that an enlarged tonsil is in an unhealthy condition, and I regret that I misunderstood him on this point: but the misunderstanding was a natural one, for he says in his paper that "it must be remembered that all enlarged tonsils are not diseased." On the main point, I am afraid that we must remain in disagreement; I have seen, and

## General Notes

still see, so many cases which in partially removed tonsils continue to give trouble, that I am firmly convinced, after long trial of both methods, that a tonsil, if removed at all, should be removed entirely.—  
Yours faithfully,

HAROLD BARWELL.

SIRS,—In the March issue of the Journal Dr MacGibbon of Christchurch, N.Z., asks for an authoritative opinion upon “The Blood-Clot Method of Closing the Mastoid after the Simple Operation.” If he will refer to the Journal, March 1919, p. 73, he will find the technique of the method described by me when I showed a consecutive series of 12 cases before the Otological Section of the Royal Society of Medicine.

I think he will allow that the success of the method does not depend on “luck, or to the fact that the operation was not necessary.”

Since the meeting referred to above, the method has been extensively practised by others, amongst whom I may mention Mr Musgrave Woodman of Birmingham and Dr M’Nab of Johannesburg.

The essentials for success are *complete* removal of the infected mucous membrane of the antrum and of every infected mastoid cell; the cleansing of the bone wound with hydrogen peroxide followed by the application of methylated spirit to dry the wound; and finally, a free application of a B.I.P.P. of the consistence of liquid cream. The skin wound is then sutured in its entirety and pressure applied in order to squeeze out between the stitches as much blood and emulsion as is possible. Of course the meatus is sterilised as completely as possible.

As a rule the patient can leave the hospital in ten days with a well-healed wound.

I have never had a fatality following this method, although many of the cases have presented themselves with half an inch of cedema over the outer surface of the mastoid, and in others the dura mater has been exposed by the disease over the lateral sinus or the roof of the antrum.—Yours, etc.,

HERBERT TILLEY, F.R.C.S.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W. 1.

*Section of Laryngology*—President, Sir William Milligan, M.D. *Hon. Secretaries*, Walter G. Howarth, F.R.C.S., and T. B. Layton, D.S.O., M.S. The Annual Meeting of the Section will be held on Friday, 5th May, at 4.45 o'clock.

As the Council of the Section has decided to abandon the ordinary

## General Notes

Summer Meeting of the Section in June on account of the Meetings in Paris and Glasgow in the month of July, it is proposed to hold a *Special Summer Meeting on Friday, May 5th*, which will commence at 3 o'clock.

No papers will be read: the Agenda will contain clinical material only.

The Annual Dinner of the Section will be held on the same evening at the Trocadero.

*Section of Otology*—*President*, Dr A. Logan Turner. *Hon. Secretaries*, Norman Patterson, F.R.C.S., and F. J. Cleminson, M.Ch. The Annual Meeting of the Section will be held on Friday, 19th May, at 5 o'clock.

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### BRITISH MEDICAL ASSOCIATION, GLASGOW.

The Ninetieth Annual Meeting of the British Medical Association will be held under the Presidency of Sir William Macewen, F.R.S., from the 25th to the 29th July inclusive. The Sectional Meetings are arranged for the 26th, 27th, and 28th. Laryngology and Otology have been placed in the Single Day Sections.

The following Office Bearers have been elected:—

*Section of Laryngology*—*President*, Dr John M'Intyre, Glasgow. *Vice-Presidents*, Dr A. Brown Kelly, Glasgow; Sir St Clair Thomson, London. *Hon. Secretaries*, Dr Francis Frederick Muecke, 36 Cavendish Square, London, W. 1; Dr William Smith Syme, 11 Lynedoch Crescent, Glasgow.

*Section of Otology*—*President*, Dr A. A. Gray, Glasgow. *Vice-Presidents*, Dr J. G. Connal, Glasgow; Dr W. F. Wilson, Newcastle-on-Tyne. *Hon. Secretaries*, Mr F. J. Cleminson, 32 Harley Street, London, W. 1; Mr J. W. Leitch, 6 Clairmont Gardens, Glasgow.

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### TENTH INTERNATIONAL OTOLOGICAL CONGRESS, PARIS, 19th to 22nd July 1922.

The Meetings will be held in the École de Médecine.

The following subjects for discussion (*Rapports*), have been arranged:—

- I. Abscess of the Cerebellum.
- II. Otitic Meningitis.
- III. The Value of Functional Tests of the Vestibular Apparatus.
- IV. Syphilis of the Ear.

The speakers will be:—MM. Buys, Gradenigo, Hennebert, Hinojar, Jenkins, Quix, and Schmiegelow.

During the Congress, a Supplementary Meeting will be devoted to the discussion of the following subject:—

“The Treatment of Cancer of the Larynx by Operation  
and by X-rays and Radium.”

The speakers will be:—MM. Chevalier-Jackson, Moure, Regaud St Clair Thomson, Sebileau, and Tapia.

The subjects for discussion will be printed and distributed before the Congress meets.

## General Notes

The mornings will be occupied in visiting the Departments for the treatment of Diseases of the Ear, Throat, and Nose, and for the surgery of the Head and Neck. (Operations, presentation of patients, etc.)

A collection of instruments and of anatomical and surgical specimens relating to diseases of the ear, nasal fossæ and nasopharynx, will be shown at the Faculty of Medicine during the Congress.

The Committee of Organisation are desirous of obtaining the enrolment of members of Congress, not later than 1st April. Notification must be made to Dr A. Hautant, Secrétaire Général, 28 rue Marbeuf, Paris (VIII).

Further, they desire to receive the titles of papers and communications from members of Congress as soon as possible after their enrolment.

The subscription, which entitles members both to a copy of the *Rapports* and to the résumé of papers, is £2 sterling, and should be paid to the Treasurer, Dr George Laurens, 4 Avenue Hoche, Paris (VIII).

In order to facilitate arrangements, members are requested to state whether they intend to be accompanied by members of their family.

Tentative arrangements have been made at the Hôtel St James et d'Albany, 211 Rue St Honoré, for the accommodation of British Members of Congress.

Those who propose attending the Congress must make their own arrangements, both as regards their rooms at the Hotel and their journey to and from Paris.

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The American Laryngological Society will meet, under the Presidency of Dr Harmon Smith, in Washington, D.C., on the 1st, 2nd, and 3rd May.

The American Otological Society, under the Presidency of Dr H. S. Birkett, Montreal, will meet in Washington, D.C., on the 2nd and 3rd May, *Hon. Secretary*, Dr Thomas J. Harris, 104 East 40th Street, New York.

A cordial invitation to attend the Meeting has been extended by the American Otological Society to the Section of Otology of the Royal Society of Medicine.

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The Section of Laryngology and Otology of the American Medical Association, under the Presidency of Dr Joseph A. Stucky, will meet at St Louis from the 22nd to the 26th May.

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La Société Française d'Otologie, de Rhinologie et de Laryngologie will hold its Annual Meeting in Paris on the 17th and 18th July.

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The Congress of La Société Belge d'Otologie, de Rhinologie et de Laryngologie, will be held in Ghent in July 1922.

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*The British Medical Journal* informs us that Professor E. J. Moure, the well-known oto-laryngologist of Bordeaux, has been made a Commander of the Legion of Honour, which is the highest of the three grades of this distinction. We offer him our sincere congratulations. Professor Moure is well known in this country, where he is a *persona grata*, not only through the *Revue de Laryngologie, d'Otologie et de Rhinologie* which he so ably edits, but from his scientific researches.

## General Notes

In the Annual Report of the Manchester and District Radium Institute for 1921, reference is made to the result of treatment of cases of malignant disease affecting localities which come under the cognisance of the nose and throat specialist. We find it stated that 25 per cent. of the cases of carcinoma of the lip have remained well for over two years, 2 of them between four and five years. Dr Burrows is of the opinion that carcinoma of the mouth and tongue is not a favourable condition from the point of view of radium owing to the rapid formation of secondary deposits. Carcinoma of the thyroid gland is amenable, and 4 cases have been well for over three years, and 2 of them between six and seven years. Of the cases of sarcoma of the nasopharynx, 2 have been alive and well between six and seven years, and 1 between two and three years. Fifty-two cases of exophthalmic goitre are recorded as cured: that is to say, all symptoms and signs of disease have disappeared for over two years and only one recurrence is recorded. Much patience is required in the treatment of these cases.

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### THE EIGHTH NERVE AND THE NEUROLOGIST.

We extract the following from a paper by Dr Tom Williams, Washington, D.C., which appeared in *The Medical Press and Circular*, 22nd February 1922:—

“A knowledge of the structure and function of the nervous system is absolutely essential for the interpretation of many disorders of hearing, too often treated merely empirically. Tumours of the posterior fossa, sclerotic processes in the mid-brain, affections of the temporal lobe and its tracts, nascent tabes dorsalis, all affect hearing. But the eighth nerve also contains the pathway of the vestibular sense, and furnishes the impulses for the complex integrations of orientation with the movements of the eye, trunk, and limbs. Space forbids details of the numerous tests of these functions and their interpretation, to which minute knowledge of the central nervous system is also absolutely necessary.

“The so-called Bárány methods are quite inadequate to a complete study of these integrations. Even the much finer differentiations ascertainable, thanks to the researches of Lombard, are the better for the assistance of the knowledge in the hands of an experienced neurologist. The realisation of this need is, I regret to say, absent from the minds of too many otologists. I trust that my colleagues will have greater success in educating the ear specialists to this lack than has fallen to my lot. *How can we blame the public and legislators for their recognition of osteopathy, chiropraxy, and Christian Science*, and criticise them for not distinguishing between the training of these persons and one of us, when so many of us roll like a mole in a hole around a single function or a minute organ, refusing the vast perspective afforded by the linkage of function and of organ with the ramifications of the nervous system which controls them all.”

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## THE SO-CALLED PROLAPSE OF THE LARYNGEAL VENTRICLE, AND EVERSION OF THE SACCULUS.\*

By IRWIN MOORE, M.B., C.M. Edin., Surgeon to the Hospital  
for Diseases of the Throat, Golden Square.

*A Study of 85 Cases—the Total Number recorded in the Literature since the  
First Case of the Latter Condition was described by Moxon in 1868.*

AN interesting and uncommon case exhibited by Frederick Spicer<sup>1</sup> at a Meeting of the Section of Laryngology, Royal Society of Medicine, on 3rd December 1920, and referred to later in detail in this Monograph, in which a "tumour" inflated with air protruded from the lateral wall of the larynx into its cavity, suggested to the writer a thorough investigation into the subject of "So-called Prolapse or Eversion of the Laryngeal Ventricle, and Laryngoceles." The following contribution, with the kind help of Prof. S. G. Shattock, records the result of a research in respect of the first portion of the subject. The second portion, dealing more fully with Laryngoceles, is in course of preparation and will be published later.

Much confusion and ambiguity exist as to the nomenclature adopted in connection with the matter of the present paper. The term Prolapse of the Ventricle was introduced into laryngological terminology by Lefferts<sup>2</sup> in 1876, and that of Eversion of the Sacculus by Moxon<sup>3</sup> (Guy's Hospital) in 1868. Morell Mackenzie<sup>4</sup> in 1880 (using the term Ventricle and Sacculus

\* This paper was read at the Third Summer Meeting of the Section of Laryngology, Royal Society of Medicine, on 3rd June, 1921, under the title of "Eversion of the Sacculus Laryngis, the So-called Prolapse of the Laryngeal Ventricle." It has been revised after further investigation and is published under the above new title with additional notes and illustrations.

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synonymously) referred to Eversion of one or both ventricles as an extremely rare form of intra-laryngeal dislocation, and considered that it was the only intelligent source of error in the diagnosis of benign growths of the larynx. He stated that he knew of only three such cases in medical literature, two of these being recognised on post-mortem (Moxon's<sup>3</sup> and his own case<sup>4</sup>), and a third (Lefferts'<sup>2</sup>) in which it was recognised during life.

The term "Prolapse of the Ventricle" is at present used universally for all manner of conditions, although as Moller<sup>5</sup> in 1905 remarked, most authors consider that it does not cover the nature of the disease and that the majority of the cases described in the literature deal with something entirely different from a prolapse. He referred to the term as having lost its meaning, and quotes Lussan<sup>6</sup> (Paris) who says: "By the term Prolapse of the Ventricle of Morgagni, one understands a more or less big tumour of the larynx, red in colour, and with a smooth surface, which seems to emanate from the ventricle." Stoerck<sup>7</sup> (Berlin) in 1880 (quoted by Koschier<sup>8</sup>) was the first to describe the primitive origin of these tumours (see Histology, p. 273). Fränkel<sup>9</sup> (Vienna) in 1894, concluded that "what was generally collectively expressed under the heading of 'prolapse of the ventricle' represented either a hyperplasia of the true or false vocal cord, a lateral laryngeal hyperplasia, or a combination of these conditions."

Koschier<sup>8</sup> (Vienna), in 1897, agreed with the views suggested by Stoerck,<sup>7</sup> and also confirmed the opinion expressed by Fränkel<sup>9</sup> (see Histology, p. 273). Mygind<sup>10</sup> (Copenhagen) in 1901, also holds that "Prolapse" is merely a localised hypertrophy of the mucous membrane which lies round the orifice of the ventricle, and remarks that it is called "prolapse of the ventricle of Morgagni" because it was formerly supposed to be prolapse of the mucous membrane.

Garcl,<sup>11</sup> in 1901, reviewed the literature and found that the laryngeal condition described as "Eversion of the Ventricle" was employed for very dissimilar lesions, owing, he says, to the fact that authors had based their conclusions only on cases observed by themselves.

Delsaux<sup>12</sup> (Brussels), in 1905, remarked that since Fränkel's studies in 1894, unanimity has not been reached as to what is to be understood by "Eversion and Prolapse of the Ventricles of Morgagni." In drawing attention to the rarity of the



# Prolapse of Laryngeal Ventricle

occurrence, he showed a pathological specimen removed from a cured patient, and suggested that by "prolapse" was understood a hernia of the mucous membrane through the natural orifice of the ventricle.

Jobson Horne<sup>13</sup> has recently (1921) made the statement that "prolapse of the ventricle is not a traditional theory, but is an entity; and that tumours of the ventricle with which it has been confused are relatively rare." In support of this view, he cites the earlier writers, and refers to a case he had met with, in which he states that the wall of the ventricle, following the breakdown of a gumma, suddenly gave way, protruded into the larynx, and suffocated the patient.

## DEFINITION OF TERMS.

By "Prolapse of the Ventricle," the term in general use, is to be understood (as a critical examination of the different cases shows) the protrusion of a portion of the ventricular mucosa as a result of inflammatory cedema or hyperplasia, so that parts of the ventricle normally out of sight are carried inwards along with the swelling, and come to be brought into view of the laryngoscope.

By the term "Eversion of the Ventricle" should be understood an inward displacement or invagination of the mucosa of the ventricle, so that it protrudes between the ventricular band and the vocal cord into the air-way. This has not been observed apart from an inflammatory cedema or thickening, or from the concurrent growth of a cyst or tumour.

In the case of the Sacculus, the term "Eversion" signifies a turning inside out of the sac, and its subsequent displacement between the ventricular band and vocal cord into the air-way. Although the condition of eversion of the ventricle has not yet been observed, it is conceivable that after complete eversion of the sacculus the process of displacement might extend, and subsequently involve the mucous membrane of the ventricle itself.

## THE ANATOMY OF THE PARTS CONCERNED IN THE CONDITIONS NAMED IN THE TITLE.

**The Laryngeal Ventricle** was well known to the ancients, for Galen<sup>14</sup> first described it, A.D. 300; later, Morgagni<sup>15</sup> in 1741, and Savart<sup>16</sup> in 1825, but these writers confined themselves to a very incomplete account. Morgagni acknowledged

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the priority of claim of Galen in the recognition of the ventricle, and, as Nolan Mackenzie<sup>17</sup> remarks, properly speaking it should be called the ventricle of Galen. Cruveilhier<sup>18</sup> (Paris) in 1834, referred to the sacculus, and John Hilton<sup>19</sup> in 1837, studied in detail the glands belonging to the pouch and pouring their secretion into it, the muscles capable of acting upon it directly, its fibrous connective tissue investment, and the nerves supplying it.

The Ventricle is a horizontal space, elliptical in shape, which is situated between the true and false vocal cords, from the roof of which towards the anterior part there arises a vertical pouch known by anatomists as the sacculus. According to Rüdinger<sup>20</sup> (Berlin) the ventricles are relatively much larger in the male. Occasionally great over-development is met with.

This space and the sacculus have been variously referred to by different laryngologists, for example:—Lennox Browne<sup>21</sup> described the ventricle as leading up to the sacculus, of which he says it constitutes the inferior aperture. Bosworth<sup>22</sup> (New York) remarked that in the anterior part of each ventricle there is a narrow pouch-like cavity, the sacculus laryngis.

Nolan Mackenzie<sup>17</sup> and others, on the other hand, consider the ventricle as consisting of two parts, a horizontal and a vertical portion or sacculus.

Anatomists have described the parts as follows:—

Cunningham<sup>23</sup> defines the ventricle as a pocket-like depression or recess—"the laryngeal sinus"—the mouth of which is somewhat narrower than its cavity, and the laryngeal saccule (or appendix ventriculi) as a diverticulum of mucous membrane which ascends between the false vocal cord and the ala of the thyroid cartilage.

Quain<sup>24</sup> refers to the laryngeal ventricle as an elongated depression between the superior and the inferior vocal cords. He defines the laryngeal pouches as small recesses which lead from the anterior part of the ventricle upwards.

Morris<sup>25</sup> refers to the ventricle as an antero-posterior pocket of the mucosa undermining the ventricular folds and opening into the cavity of the larynx by a narrow mouth. From its anterior part a small diverticulum—the ventricular appendix—extends upwards.

Piersol<sup>26</sup> (Philadelphia) defines the ventricle or "laryngeal sinus" as a horizontal elliptical opening with a vertical breadth

## Prolapse of Laryngeal Ventricle

of from 3 to 6 mm., and the sacculus as an ascending portion or appendix of the ventricle—which may be a separate cavity connected with the front of the ventricle by a slit or an irregular opening. Not rarely, he says, it is a prolongation of the ventricle.

*Boundaries of the Ventricle.*—Its upper wall is formed by the ventricular band; its floor, by the lateral portion of the vocal cord and thyro-arytenoideus muscle; its lateral wall by the upper fibres of the thyro-arytenoideus, and the thyroid cartilage invested with its perichondrium.

Monnelles<sup>27</sup> (Florence), in 1900, attempted to reproduce the condition of Eversion of the ventricle artificially in 33 cases after death without success: in every case the mucous instead of the submucous membrane was torn on attempting to draw out the lining of the ventricles.

**The Sacculus Laryngis.**—The Sacculus Laryngis, or more correctly speaking, the Sacculus Ventriculi Laryngis, lies between the ventricular band and the inner surface of the thyroid cartilage (Fig. 1). It extends directly upwards from the anterior part of the ventricle, and represents the cervical pouches or air-sacs which in anthropoids are connected with the ventricles, and in some cases extend over the front of the neck and chest, even as far as the axillæ. The Sacculus varies greatly in size and shape; sometimes it is nearly conical with its base below, in other cases it is pear-shaped with its broader part above; occasionally it is nearly cylindrical; and generally curved upon itself like a Phrygian cap (see Figs. 2, 4, 5). It averages about half an inch in the vertical direction, reaching nearly to the upper border of the thyroid cartilage, and in very rare cases extending as high as the hyoid bone.

*Boundaries of the Sacculus.*—Its outer or thyroideal surface (Fig. 2) is covered in its upper portion by the superior fibres of the thyro-epiglottideus muscle, which curves upwards, inwards, and a little forwards over it, where the muscle blends with the fibres of the aryteno-epiglottideus inferior, whilst in its lower portion it is covered by some of the upper fibres of the thyro-arytenoideus immediately after the origin of the latter from the thyroid cartilage. Its inner or laryngeal surface is bounded by the ventricular band, above which it is covered by a thin layer or slip of muscular fibre, the aryteno-epiglottideus inferior (Compressor Sacculi Laryngis of Hilton<sup>19</sup>) connected above with those fibres of the same muscle found in the aryteno-epiglottic

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folds (Fig. 3). In Hilton's<sup>19</sup> dissection the aryteno-epiglottic folds have been cut away, hence the superior fibres of the aryteno-epiglottideus which pass upwards to the epiglottis are not shown. These superior fibres are well seen in Shattock's dissection, illustrated in Quain's<sup>24</sup> *Anatomy*, Fig. 182, p. 160.

The summit of the pouch is crossed from behind forwards by the aryteno-epiglottideus inferior (Fig. 3). Hilton<sup>19</sup> expressed the opinion that these muscles compress the sacculus and discharge the secretion it contains upon the vocal cords, the surface of which it presumably lubricates. The sacculus which is invested throughout with closely-set mucous glands lies in a loose connective and adipose tissue (see Hilton's dissection, Fig. 4, also Shattock's dissection in Quain's *Anatomy*).

Hilton<sup>19</sup> states that the sacculus is enclosed in a fibrous membrane or capsule continuous below with the ventricular band (thyro-arytenoid ligament), to which it is firmly attached in nearly its whole length, anteriorly to the edge of the epiglottis and superiorly to the thyroid cartilage. He suggests that this may be regarded as forming an internal and superior support to the sac—a suspensory ligament—and constitutes its chief anatomical safeguard against prolapse. Hilton also suggests that the fat probably plays an important part in the regulation of sounds produced in the larynx by arresting vibration.

*The Mouth of the Sacculus* is situated in the anterior third of the roof of the ventricle, is of narrow oval shape, and measures in a well-developed larynx 8 mm. (see Figs. 8 B *a* and 8 C *a*).

Fig. 8 A shows a coronal section of a well-developed adult male larynx, made through the middle of the sacculus (*a*), the anterior portion of the ventricle (*b*), and the opening of the former into the latter. Below the ventricular orifice of the sacculus there is a distinct horizontal fold of the ventricular mucosa.

Fig. 8 B shows the posterior half of the same larynx viewed from the inner aspect, and exhibits the posterior extremity of the ventricle (*b*), together with the posterior part of the oval opening (*a*), which leads into the sacculus. Between the two there is a delicate ridge of the ventricular mucosa—the frænum of Hilton.

Fig. 8 C shows a horizontal section of the right half of the same larynx carried through the ventricle, between the ventricular band and the vocal cord. The parts are viewed from below

## Prolapse of Laryngeal Ventricle

and exhibit the roof of the ventricle together with the elongated oval opening of the sacculus (*a*); the limits of the ventricle proper are traceable by the cut edge of the mucous membrane (*b*). The form of the mouth is said to vary according as the vocal cords are stretched or relaxed; in the former case being nearly oval, and in the latter more circular.

Hilton<sup>19</sup> described the opening as provided with two crescentic folds of lining mucous membrane placed anteriorly and posteriorly with reference to the centre of the aperture, with their concave edge towards each other; and he stated that these folds are not exactly at the same level—the anterior being slightly higher than the posterior. He suggested that their purpose was to break the stream of fluid from the sac and give it a central distribution and general diffusion over the surface of the vocal cords.

It may be noticed here that the development of these more minute details varies, as in so many anatomical structures elsewhere.

### **The Normal Histology of the Ventricle and Sacculus.—**

The mucous membrane of the ventricles and of the sacculus is invested with columnar ciliated epithelium. The ventricular band is particularly rich in mucous glands, especially in the neighbourhood of the sacculus; whereas in the lower and lateral walls they are few. On the other hand, on the inner surface of the sacculus there are the orifices of the ducts of numerous small follicular glands—as many as sixty or seventy may be recognised—which are lodged in the submucous areolar tissue (see Hilton's dissection, Fig. 4).

Lennox Browne,<sup>21</sup> in 1899, pointed out that the mucous membrane in the ventricle presents well-marked corrugations, especially in the upper and outer walls “irregularities of surface often so accentuated as to constitute a long tongue-like fold projecting across the ventricle almost to the glottic aperture.” He remarked that “this is of sufficiently frequent occurrence as to afford a reasonable explanation of the condition described as Eversion or Prolapse of the Ventricle, for the ‘tongue,’ or corrugation might under certain morbid conditions become sufficiently hypertrophied and prominent to constitute the characteristic laryngoscopic appearance often described under the above name.”

Koschier,<sup>9</sup> in 1897 (as previously stated), first suggested that oedema and hyperplasia of the ventricle generally started from

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these irregularities and later projected into the interior of the larynx. In the specimen of hyperplastic tuberculosis in the Museum of Golden Square Hospital, Lennox Browne's surmise is proved to be correct. (See under Spurious Eversion, Fig. 24.)

The normal human larynx (Fig. 8A, p. 16) shows one such horizontal fold in the ventricle (*c*). Compare also with Albrecht's<sup>28</sup> findings in the ventricle of the dog (see p. 273).

### COMPARATIVE ANATOMY OF THE VENTRICLE AND SACCULUS.

**The Ventricle and Sacculus of the Ape.**—In the Ape, sacs or aërial reservoirs extend from the mucous membrane of the ventricle outwards through the side of the thyro-hyoid space. Prolongations from the main sac may reach upwards to the angle of the jaw, downwards along the middle line of the neck on to the chest, and laterally under the pectoral muscles to the axillæ.

Fig. 9 shows the larynx of a Gibbon (*Hylobates Syndactylus*)\* opened from the dorsal aspect: from the ventricles, the sacculi extend upwards and forwards through the thyro-hyoid space to form by their coalescence a large globular pouch situated in the middle line of the neck. The pouch has been opened to show its partial subdivision by a septum that evidently represents the remains of the fused walls of a bilateral protrusion.

**The Ventricle and Sacculus in the Horse.**—Sisson<sup>29</sup> (Philadelphia) has described the ventricle of the horse as a pocket-like depression which is the entrance to the laryngeal sacculi (*sacculus laryngis*), and the latter as a cul-de-sac of the mucous membrane which is an inch or more long, and extends upwards and backwards on the medial surface of the thyroid lamina. The sacculus is in relation to the ventricular and vocal muscles, and when the latter are atrophic (as in hemiplegia laryngis or "roaring") the pouch is found to be considerably larger on the affected side, having occupied the space of the atrophic muscles. The blind end of the sacculi lies just below the level of the muscular process of the arytenoid cartilage. It is loosely attached to the contiguous structures. The average capacity of the sacculi is about 5 to 6 c.c. Sisson<sup>29</sup> illustrates in his book on the *Anatomy of the Domestic Animals*

\* Specimen No. 1173 Bd., from the Museum of the Royal College of Surgeons, specially drawn for the author to illustrate this paper.

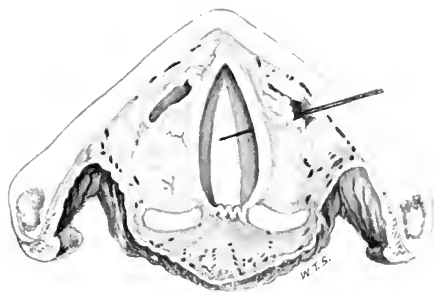


FIG. 1.—Horizontal Section of the Normal Larynx above the Glottis, showing the relations of the Sacculus. A black bristle has been passed through the right Ventricle into the corresponding Sacculus. (Dissection by S. G. Shattock.)

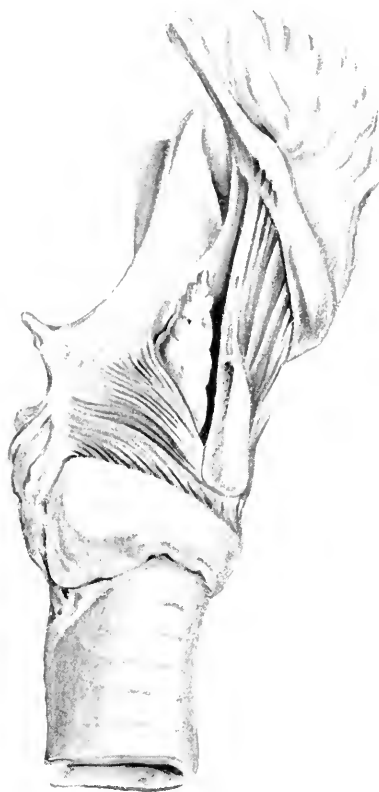


FIG. 2.—Larynx with right Ala of the Thyroid Cartilage removed, showing the external or thyroideal aspect of the right Sacculus Laryngis covered by its glands, and the relationship of the Thyro-arytenoid muscle. (From a dissection by John Hilton.)

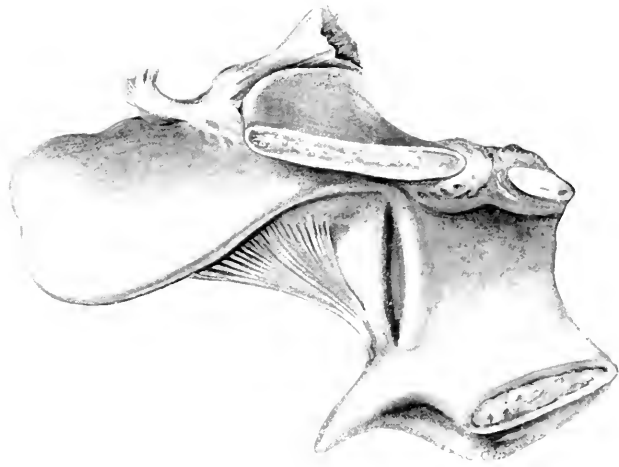


FIG. 3.—Section through the right side of the Thyroid and Cricoid Cartilages showing the left Ventricle, the Compressor Sacculi Laryngis (*Aryteno-epiglottideus inferior*) Muscle, and a portion of the inner wall of the Sacculi exposed by removal of the Mucous Membrane. Note the weak triangular area below the lower fibres of the *Aryteno-epiglottideus* Muscle, through which a hernia of the Sacculus might protrude. (From a dissection by John Hilton.)

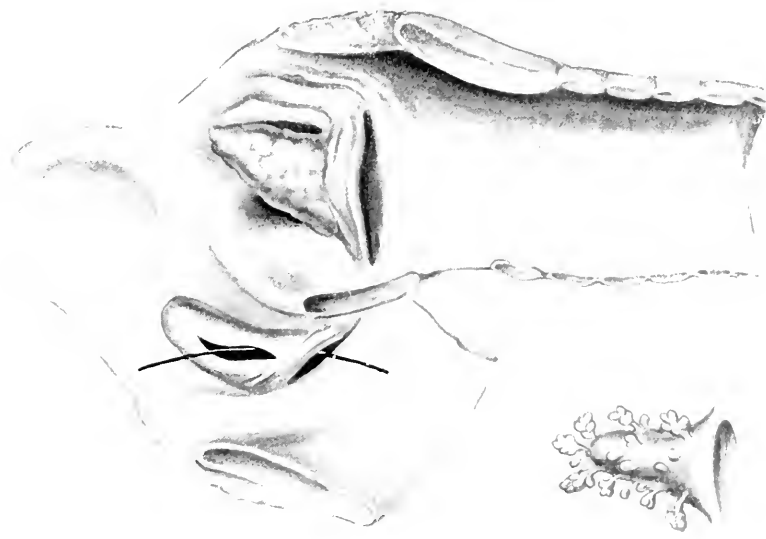
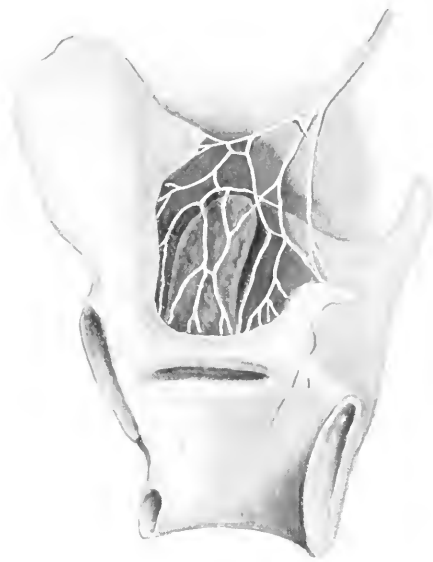


FIG. 4.—View of the interior of the Larynx showing the Sacculus Laryngis on the right side exposed by removal of the mucosa with its glands resting upon it, and on the left side cut open and a bristle passed through the natural opening into the Ventricle. The illustration to the left represents the Sacculus Laryngis with the glands and their ducts raised from the pouch. A sketch showing their general character rather than actual size and relative position. (From a dissection by John Hilton.)





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FIG. 5.—Section through the Thyroid and Cricoid Cartilages showing the right Sacculus Laryngis dissected and branches of the Superior Laryngeal Nerve distributed over its inner aspect. (From a dissection by John Hilton.)

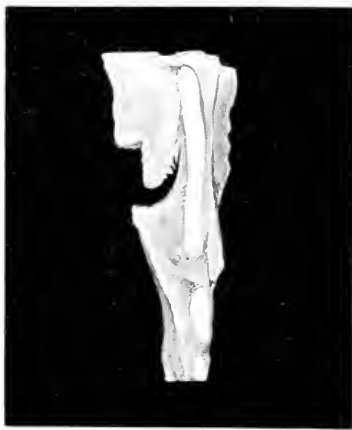


FIG. 6.—A Coronal Section of one-half of an adult male Larynx, carried through the middle of the Sacculus (after hardening in formol solution), showing the cross-sections of three or more horizontal rugæ projecting from the inner wall of the Sacculus, such as may undergo hyperplastic lengthening in tuberculosis and come to project through the Ventricle of Morgagni so as to simulate Eversion. The uppermost of the three projections is the section of the cushion of the Epiglottis.



FIG. 7.—The same Coronal Section from which the fat has been removed by ether, and the inner wall of the Sacculus forcibly drawn towards the middle line, showing the way in which (in this particular specimen) the outer wall of the Sacculus is attached by fine processes of strong fibrous tissue to the Perichondrium over the Thyroid Ala. The small spherical structures projecting from the roof into the artificial space, previously occupied by fat, are glandular. The fibres attaching the Sacculus to the Thyroid Cartilage are not referred to by Hilton, who describes no direct attachment of the Sacculus on its outer aspect. They are, however, only occasionally present, there being, as a rule, no attachment whatever in this position.

(From dissections by S. G. Shattock, F.R.S.)

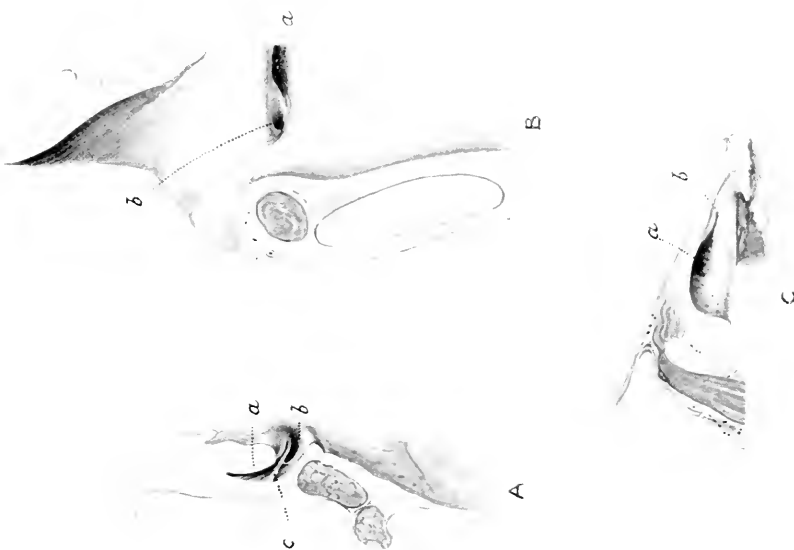
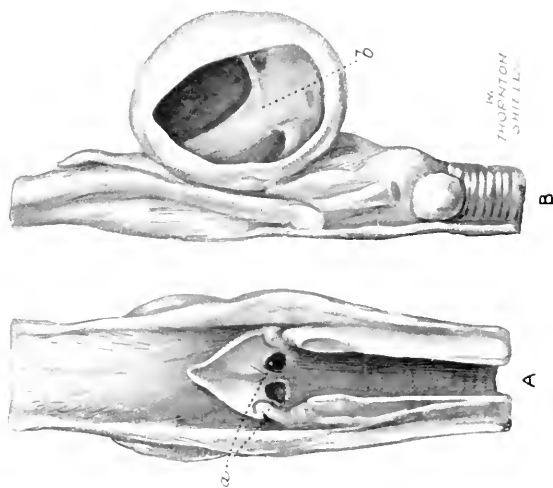


FIG. 8.—(A) Coronal Section of Larynx through the middle of (a) Sacculus, and (b) Ventricle; showing opening of former into latter, and (c) a horizontal fold of mucosa. (B) Posterior half of the same Larynx viewed from the inner aspect, showing (a) opening of Sacculus, (b) posterior end of Ventricle. Between these the posterior frenum of Hilton is seen. (C) Horizontal Section of right half of same Larynx, carried between ventricular band and vocal cord—viewed from below—showing (a) mouth of Sacculus, (b) cut edge of mucosa which marks the limit of the Ventricle. (Dissection by S. G. Shattocks.)



HYLOBATES SYNDACTYLUS (Gibbon).

FIG. 9.—Shows the fusion of the Sacculus on each side to form a single large Air-sac in the middle line of the neck.  
A—Posterior view showing (a) opening of the Ventricle.  
B—Lateral view of the Air-sac showing its partial subdivision by a median septum (b).

## Prolapse of Laryngeal Ventricle

on p. 522, a section of the larynx of a horse cut parallel with the vocal cords, Fig. 465, also a cast of the right lateral ventricle and sacculus showing a medial view, Fig. 466, and a lateral view, Fig. 467. There are also two specimens in the Museum of the Royal College of Surgeons, H.S. 1170 Ab. and H.S. 1170 Af., Room 4, top Gallery.

**The Ventricle and Sacculus of the Ox.**—The lateral ventricle is represented by a very shallow depression, and the sacculus is absent.

**The Ventricle and Sacculus of the Dog.**—The true vocal cords are large and prominent. Sisson<sup>29</sup> refers to the large lateral ventricle as a long slit parallel with the anterior margin of the true vocal cord, and the laryngeal sacculus as extensive, and lying lateral to both true and false cords.

Albrecht<sup>28</sup> has described the ventricle as being deep and roomy, and the appendix (sacculus) as normally very large and distended like a pocket, extending upwards towards the lateral surface of the epiglottis. The ventricle in its deeper part, he says, possesses a border or fold, formed by the thyro-arytenoideus muscle, which is less marked anteriorly than behind. The base of the fold is situated at the lower part of the lateral wall of the ventricle near where this passes into the vocal cord.

### HISTOLOGY OF THE SO-CALLED PROLAPSE OF THE VENTRICLE.

Stoerck,<sup>7</sup> in 1880, is said by Koschier to have been the first to ascribe the primitive origin of these "tumours" to a catarrh of the peripheral portion of the vocal cord, as well as of the mucous membrane of the ventricle itself, leading to the production of "a flat pad-shaped" protuberance of these parts.

Chiari,<sup>30</sup> in 1895, refers to this theory as having been advanced by Schroetter<sup>31</sup> in 1887, and confirmed by Fränkel<sup>8</sup> in 1894, and describes these tumours as hypertrophied folds of mucous membrane proceeding from the wall of the ventricle, and penetrating into the larynx; the mucous membrane being displaced into the interior of the larynx by its own weight (assumed by Chiari<sup>30</sup>).

Koschier<sup>9</sup> agrees with these views, and, in 1897, described histologically "tumours" or portions of tumours removed endolaryngeally in a series of 19 cases of so-called "Prolapse of the Ventricle" observed in his clinic during six years. Four were

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bilateral, 3 were situated on the right, and 11 on the left side. In 16 of these cases a chronic catarrhal inflammation was present along with œdematous hyperplasia of the sub-epithelial connective tissue, which confirmed the opinion previously expressed by Fränkel<sup>8</sup> in 1894, as to the histology of these "tumours" (see p. 273). Mucous glands were either absent or present in small numbers only.

Koschier<sup>9</sup> has experimentally produced an acute hyperplasia (Prolapse) of the mucous membrane of the ventricle in the dog, by penetrating the larynx with a needle. He found that the base of the prolapse was situated exactly along the muscular band in the ventricle (described by Albrecht<sup>25</sup>) and concludes that the prolapse may be ascribed to œdema of the tissues accompanying an inflammation of the mucous membrane.

*(To be continued.)*

## THE MODIFIED RADICAL MASTOID OPERATION: ITS INDICATIONS, FINDINGS, AND RESULTS.\*

By DONALD WATSON, M.B., F.R.C.S., Clinical Tutor, Ear  
and Throat Department, Royal Infirmary, Edinburgh.

THIS paper is based on 84 consecutive cases operated on by Drs A. Logan Turner and J. S. Fraser between January 1907 and August 1921, and embraces 11 cases reported on by J. S. Fraser and J. K. M. Dickie (*Journal of Laryngology and Otology*, 1912, vol. xxvii. p. 139), and 17 cases recorded by J. S. Fraser and W. T. Garretson (*ibid.*, 1919, vol. xxxiv. p. 433).

**Indications for Operation.**—The operation was performed in cases of chronic middle-ear suppuration which required operation but which possessed sufficiently good hearing to justify the attempt being made to preserve a more useful organ than would probably be obtained by the radical method. The particular indications for the operation may be thus defined:—  
(a) Cases of Unilateral disease in which the hearing is good or fair in the affected ear (see later for definition of “hearing”);  
(b) Cases of Bilateral deafness in which the preservation of hearing in the ear to be operated upon is desirable.

In many cases not included in this paper, the surgeon began to operate with the intention of performing the modified radical, but abandoned the procedure in favour of the “radical,” owing to the conditions found during the course of the operation.

Cholesteatoma was not considered a contra-indication to the modified operation.

**Details of Cases.**—*Sex*—Of the 84 cases, 51 were males, 33 females.

*Age (in decades).*—One to 9 years—14; 10 to 19—27; 20 to 29—23; 30 to 39—12; 40 to 49—5; 50 to 59—2. The age was not stated in one case. Average age was 21 years.

*Residence.*—Edinburgh and district, 51; country, 33.

*Ear Affected.*—Right, 41; left, 43.

*Cause.*—The cause of the chronic middle-ear suppuration was ascertained in only 34 cases, as follows:—measles, 11; scarlet fever, 5; influenza, 10; whooping cough, 1; accident, 2; war injuries, 4; foreign body, 1. No cause was stated in 50 cases.

\* Reports for the year 1921 from the Ear and Throat Department of the Royal Infirmary, Edinburgh (under the care of A. Logan Turner, M.D., F.R.C.S.E., F.R.S.E.).

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*Duration.*—Most of the cases gave a history of disease for more than 2 years, the longest being 35 years, the shortest 7 days. The short history was obtained in a case of foreign body in the ear, but as there was a polypus present in the meatus, it was probably an old case of chronic suppuration.

**Condition of External Meatus and Tympanic Membrane on the Operated Side before Operation.**—In 21 cases the membrane could not be seen owing to (a) polypus, 9 cases; (b) sagging of the meatal walls, 9 cases; (c) meatal stenosis, 3 cases. In the remaining 63 cases the condition was as follows:—posterior marginal perforation, 25; attic perforation, 21; attic and posterior perforation, 8; anterior or central perforation, 8; discharging sinus over mastoid after recent Schwartz operation, 1 (this case died of meningitis).

Cholesteatoma was diagnosed before operation in 11 of the cases—7 with attic, 3 with posterior superior perforations, 1 with a polypus in which the actual perforation could not be seen.

In 6 cases a Schwartz operation had been previously performed—in 1 case on both sides.

**Condition of the External Meatus and Tympanic Membrane on the Non-operated Side.**—Normal, 22; Eustachian obstruction, 16; chronic suppurative otitis media, 13; results of chronic suppurative otitis media, 22; meatal stenosis, 1; radical operation, 7; Schwartz operation, 3.

**Hearing in the Affected Ear before Operation.**—(a) Good hearing (whisper at 6 ft. or more) in 7 cases; (b) fair hearing (c.v. 4 to 12 ft.) in 20; (c) moderate deafness (c.v. 1 to 4 ft.) in 33; (d) severe deafness (c.v. 1 ft. or less) in 12; (e) not noted (owing to age, etc.) in 12.

*Vestibular Apparatus.*—This was normal in 55; 1 case showed the fistula symptom and spontaneous nystagmus to the opposite side; the condition of the vestibule was not noted in 28. In the earlier cases, before the introduction of vestibular tests this examination was of course not carried out.

**Operative Technique.**—The procedure was the same as that adopted in the radical operation, the bridge, however, being retained in the majority of the cases. Kœrner's flap was then cut and polypi, if present, removed. In cases of attic perforation, the bridge and the outer attic wall were removed. In many of the later cases Marriage's skin graft was applied.

**Findings at Operation.**—*Superficial Tissues*—Normal, 69;

## Modified Radical Mastoid Operation

œdematous, 3; subperiosteal abscess, 3; scar of old operation, 8; scar of accident, 1.

*Mastoid Cortex*.—Normal, 76; eroded, 3; old operation cavity, 5.

*Mastoid Process*.—Acellular, 52; cellular, 10; filled by scar tissue, 1; containing granulations and pus, 8; not stated, 13.

*Antrum*.—Healthy, 15; containing brownish or greenish fluid, 7; mucopus, 23; pus and granulations, 28; cholesteatoma, 11.

*Sigmoid Sinus*.—Exposed by disease in 1 case; by gouge, 7.

*Middle Fossa*.—Exposed by disease in 1 case; by gouge, 7 cases. Both sigmoid sinus and middle fossa dura mater had been exposed by a former Schwartze operation in 2 cases.

**Progress after Operation**.—Sixty cases had a normal convalescence. One patient, an epileptic, had fits after operation, and 3 developed nystagmus. In 12 the posterior wound suppurated. Five had stitch abscesses. One developed erysipelas, and in another there was some auricular inflammation. The above 23 cases recovered with treatment. The remaining case, which had a discharging sinus over the mastoid, a failure of a recent Schwartze, developed a streptococcal meningitis. Twenty-four hours after the modified operation a trans-labyrinthine drainage of the meninges was performed. The patient died sixteen hours later, that is, about forty hours after the modified radical operation. At the *post-mortem*, although the sigmoid sinus and dura mater of the middle fossa had been exposed in the original Schwartze operation, there was no trace of old pachymeningitis in these situations, and no evidence of injury to the dura at the recent operation. The meningitis was general over the whole surface of the cerebrum. The path of infection was not cleared up.

**Results**.—Of the remaining 83 cases, 3 are known to be dead, 1 of diphtheria, and 2 of some medical trouble not noted; 50 of the surviving 80 cases have reported and have been examined; 25 of these have dry operation cavities = 50 per cent. complete cures; 17 have some meatal discharge; 8 have had the radical operation performed, 1 because the lesion was found to be tuberculous, and 7 from failure of the modified method to effect a cure.

In 9 of the 17 cases which are still discharging, granulations are present. This is possibly due to defective after-treatment. Three are cases of tubotympanic catarrh with anterior or central perforations. This class of case is now recognised as

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unsuitable for any mastoid operation, and it is worth noting that in the 8 cases of this type operated on, the antrum was the seat of disease in only one instance. Four cases show cholesteatoma. One, with a traumatic history, has a narrow meatus.

Hearing in 42 cases (50 cases reporting, less 8, in which the Radical operation was subsequently performed).	Before Operation.	After Operation.
Good . . . . .	2	13
Fairly good . . . . .	13	14
Moderate deafness . . . . .	15	13
Severe deafness . . . . .	6	1
Absolutely deaf . . . . .	...	1
Not tested . . . . .	6	...
	<hr/> 42	<hr/> 42

In 6 of the 42 cases the hearing was not noted before operation, and so in these a comparison could not be made. Of the remaining 36 cases, hearing was improved in 28 cases; it remained the same as before operation in 5 cases; and has become worse in 3 cases.

**Remarks.**—*Skin-grafted Cases*.—Of these, 15 have reported after operation. In 8 the operation cavity is dry and satisfactory. In 7 there is still some moisture or actual discharge. Twelve of these cases show improved hearing. Two show the same hearing as before operation. One was not tested.

*Cases with Cholesteatoma.*—Although prior to operation cholesteatoma was diagnosed in only 11 cases, it was found in 18 at the operation. Of the 18, 11 have reported. Seven of these are dry, and 4 still are moist. Eight of the cases show improved hearing, 2 remain as before operation, and 1 is worse.

*Details of Operations Performed.*—In 50 cases the bridge was retained. In 11 it was removed. In 23 cases the bridge and the outer attic wall were removed. This is now the routine procedure in cases with cholesteatoma with foul pus in the attic and aditus. In this connection, it is interesting to note that in 3 of the 4 cases of cholesteatoma which are still moist, the outer attic wall was not removed.

The only way to form an opinion as to the value of any operative procedure is to analyse the records relating to the particular operation, to "follow up" the cases, and to note the results.



# Modified Radical Mastoid Operation

This has been done in the Ear, Nose, and Throat Department of the Royal Infirmary, as regards, (a) the Schwartze operation by John Hewat (*Journal of Laryngology*, 1914, vol. xxix. p. 261), and Gladys A. A. Boyd (*ibid.*, 1921, vol. xxxvi. No. 5, p. 217); and also (b) the Radical operation by J. S. Fraser and J. K. M. Dickie (*ibid.*, 1912, vol. xxvii. p. 139), and by J. S. Fraser and Garretson (*ibid.*, 1919, vol. xxxiv. p. 374).

The present paper completes the series. The results are tabulated below:—

TABLE.

A. ACUTE CASES.							
<i>Schwartze Operation.</i>							
Recorder.	Total Cases operated upon.	Cases reporting after Operation.	Percentage of Dry Ears.	Percentage Hearing Results.			
				Normal.	Reduced from Normal but equal to other Ear.	Markedly reduced.	Not examined.
(1) Hewat . . .	200	106	76.7	54.7	16	16	13
(2) Boyd . . .	188	85	90.5	62.3	28.2	4.7	4
B. CHRONIC CASES.							
<i>(a) Radical Mastoid Operation.</i>							
Recorder.	Total.	Cases reporting after Operation.	Percentage of Dry Ears.	Percentage Hearing Results.			
				Improved.	The same.	Worse.	
(3) Fraser and Dickie	52	26	65.4	67.2	18.1	13.6	
(4) Fraser and Garretson	248	(a) Not grafted, 110	43	38	39	23	
		(b) Skin grafts, 46	70	48*	38	14	
<i>(b) Modified Radical Mastoid Operation (present paper).</i>							
(5) Watson . . .	84	50	50	77.7	14	8	

\* In the *Journal of Laryngology, Rhinology, and Otology* for November 1919, p. 432, the hearing after operation in the skin-grafted cases was wrongly stated in that 8 cases, in which the hearing was much improved after operation, were omitted. The paragraph should read as follows:—Hearing after operation. This was tested in 42 cases, with the following results:—Much improved, 8; improved, 12; as before operation, 16; worse, 6. Stated in percentages the results are as follows:—Much improved, 19 per cent.; improved, 29 per cent.; as before operation, 38 per cent.; worse, 14 per cent. It will thus be seen that the hearing after operation was improved or much improved in 48 per cent.

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The Table shows that the results of the Schwartze operation performed in acute cases are better than either the Radical or the Modified Radical operations performed in cases of chronic suppuration. This is only to be expected, considering the difference in duration of the pathological lesions.

When the results of the Modified Radical are compared with those of the Radical, the Table indicates a higher percentage of dry operation cavities in the latter. The resulting hearing, however, is much better with the modified procedure, thus proving its value. If the result of the modified operation is unsatisfactory and the radical cure of the suppuration is indicated, the complete operation can always be performed. Without doubt a second operation is a source of annoyance to the particular patient who has to undergo it, but the possibility of cure and the retention of a useful auditory organ by means of the modified radical, justify the adoption of the procedure in the first instance.

In conclusion, the writer wishes to thank Drs Logan Turner and J. S. Fraser for their help, and also for permission to record their cases.

## A CASE OF CAVERNOUS SINUS THROMBOSIS OF OTITIC ORIGIN BY SUPPOSED DIRECT INFECTION OF THE PETROSAL SINUSES.

By J. A. M. HEMMEON, M.D., C.M., F.A.C.S., Halifax, N.S.

APOLOGY must be offered at the outset for the absence of laboratory and *post-mortem* findings in this case. It is realised that these defects make the case of small authoritative value, but it must, nevertheless, be of interest if only for its unusual clinical features. It must be borne in mind that the case occurred in a district far from hospital and laboratory facilities.

Thrombosis of the cavernous sinus is a comparatively rare condition, and is dismissed in most modern text-books in a few lines. It is looked upon as an inoperable condition, though several routes for reaching the sinus have been suggested. It is, admittedly, generally fatal, though a few spontaneous recoveries have been noted. M'Kenzie,<sup>1</sup> in his recent book, says that it "is an uncommon sequel of lateral sinus thrombosis, and indeed is more frequently due to nasal, pharyngeal and facial infections than to aural infections."

Ballenger<sup>2</sup> says that it "is rare, and when of otitic origin usually extends from the superior or inferior petrosal sinuses." This author surely means to imply that the infection of the petrosal sinuses is usually through the lateral sinus. He cites three cases, and the first appears to be a direct infection of the petrosal sinuses. But, in this case, "mastoid symptoms developed rapidly," and the lateral sinus was opened though not found thrombosed. Death occurred on the seventh day. Ballenger<sup>3</sup> further says, "the condition usually begins in one sinus and spreads to the other through the circular sinus." So, as one goes through the text-books, one finds the condition almost invariably referred to in connection with lateral sinus thrombosis.

Rodger<sup>4</sup> reports a series of cases, in one of which he thinks he has evidence of primary infection and thrombosis of the petrosal sinuses, following acute otitis media of some weeks' standing. In his case, following a facial paralysis, the radical mastoid operation was done, the lateral sinus exposed and no clot found. Two weeks later, signs of cavernous sinus thrombosis appeared and the lateral sinus was again opened. A clot was

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evacuated and, following a gush of blood, two small, worm-like, septic clots were washed from the torcular end of the sinus. These, Rodger believes, to have come from the petrosal sinuses and that they were infected directly from the middle ear, the mastoid being found free from pus. The petrosal sinuses, lying on the pyramid of the petrous portion of the temporal bone, receive blood from the inferior cerebral and superior cerebellar veins and small branches from the tympanum. Many of these pass through the petro-squamosal suture, the remainder passing directly through the bone to the sinus. One can see how these sinuses may be directly infected through these small veins leading directly from the infected tympanum in acute purulent otitis media. I have not been able to find any further record of such direct infection, though there are almost daily reports of cases of infection through thrombosis of the lateral sinus and accompanying or following the well-known symptoms of that condition. Rodger<sup>5</sup> says that he is unable to find any record of another such case. Circulation between the cavernous sinuses is so free, through the circular sinus, that thrombosis of both sinuses, rather than of one only, is the rule.

Maybaum<sup>6</sup> says that the prognosis in this condition is quite hopeless. Suggested operative measures aim at reaching the sinus to clear out the clot.

Dwight<sup>7</sup> suggests turning down a bone flap as in the Krause operation for exposure of the Gasserian ganglion. More recently a route through the nose and sphenoidal sinuses has been suggested. Up to the present, results of operation are discouraging, and cases are usually treated conservatively after the lateral sinus has been explored.

Dwight<sup>8</sup> reports 14 cases of spontaneous recovery. Many cases of cavernous sinus thrombosis following infection of the frontal, ethmoidal and sphenoidal sinuses, as well as of the orbit, have been reported.

Kernan<sup>9</sup> presents an unusual case following peri-tonsillar abscess. In this case, the abscess being twice ineffectively incised, a thrombus involved the internal jugular vein and the sigmoid, petrosal and cavernous sinuses.

Müller<sup>10</sup> reports a case of primary thrombosis of the superior petrosal sinus, discovered while exposing the lateral sinus following mastoidectomy.

The clinical picture in cavernous sinus thrombosis is quite distinctive. There is œdema and discoloration of both lids,

# Cavernous Sinus Thrombosis

bulging and immobility of the eyeball, chemosis of the ocular conjunctiva with rapidly failing vision and characteristic excessive temperature elevation with, in some cases, marked remissions.

“The temperature is a less reliable guide in the child than in the adult and may be steadily high rather than remittent.”—OPPENHEIM.<sup>11</sup>

**Case Report.**—The case was seen and reported through the courtesy of Dr Elliott of Wolfville, N.S., who contributes the history to 17th September 1921.

Henry N., aged 5 years. *Past History.*—No illness except “Influenza” in 1918. Tendency to “Colds in head” during 1921.

*Present Illness.*—Rhinitis noticed 9th Sept. 11th Sept.—Complained of pain in left ear. First seen by Dr Elliott at noon. 12th Sept.—Pain in left ear persisting. Temp. 101.5°. Left M.T. bulging. Left M.T. incised—Free flow of blood and pus. Pain persisted through night. 15th Sept.—Temp. 102.6°. Patient dull, refuses nourishment. Left ear discharging freely. Physical examination otherwise negative. 16th Sept.—Temp. 103.6°; pulse 120. Patient dull, answers questions. Free discharge from left ear. Beginning cedema of left upper lid. 17th Sept.—Temp. 103.8°; pulse 120. Cedema of both lids noticed in the morning.

The child was first seen by the writer at 9 P.M. Temp. 104° per rectum. No history of rigors. Pulse 120. Patient unconscious but can be roused with difficulty. Face pale, skin moist, tongue coated. Abdomen and chest negative. Kernig and Babinski signs absent. Profuse foul smelling purulent discharge from left ear. When this is wiped away the M.T. is seen somewhat bulging with an incision in the posterior superior quadrant. A smear made from the pus was unfortunately lost. Head somewhat retracted but no rigidity of neck. No swelling, redness, or tenderness in the peri-auricular tissues or in the neck. There is tenderness over the entire scalp. Right M.T. somewhat red, not bulging. Pupils equal, moderately dilated, and reacting sluggishly to light. No conjugate deviation of the eyes. Some cedema of the lids noted with pale bluish discoloration. Considerable bulging of the eyeballs with ptosis and chemosis of ocular conjunctiva. Both eyes equally affected. Incontinence of urine.

A diagnosis of cavernous sinus thrombosis was made. There were no signs of mastoid involvement that might have led to lateral sinus thrombosis, consequently an operation for exposure of the lateral sinus was not advised. 18th Sept.—Seen at 3 P.M.; pulse 130, regular, moderately strong. Temp. 104.5° per rectum. Head greatly retracted. Neck somewhat rigid. Kernig’s sign slightly manifest. Babinski

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negative. Patient utters short sharp cry at intervals and is very restless. Patient is unconscious and cannot be roused. Incontinence of urine and feces. All ocular symptoms are increased. Marked cedema of lids with immobility and bulging of eyeballs and ptosis. Chemosis of conjunctiva. Pupils moderately dilated and react sluggishly to light. No conjugate deviation. Right tympanic membrane shows bulging. It was decided to incise this membrane and to enlarge the incision in the left membrane though drainage appeared good from this ear. Under light chloroform anæsthesia this was done, incision in the left drum revealing a mucopurulent secretion in the left middle ear.

At this time a lumbar puncture was made and 5 c.c. of clear fluid *under moderately increased pressure* were withdrawn. The amount of anæsthetic given was small and neither pulse nor respirations were affected during the anæsthesia. The patient was more quiet until the effects of the anæsthetic wore off. Later, increased restlessness with weakening pulse. Patient died quietly at 11 P.M. No rigors. No convulsive movements. No *post-mortem* examination was made.

Laboratory Report on examination of Cerebro-spinal Fluid —“Specimen of spinal fluid. Smear negative. Culture negative—sterile. Polymorphs, 64 per cent.”

REFERENCES.—<sup>1</sup> Dan M'Kenzie, *Diseases of Throat, Nose, and Ear*, 1921, p. 542. <sup>2</sup> Ballenger, *Diseases of Nose, Throat, and Ear*. <sup>3</sup> *Ibid.* <sup>4</sup> T. Ritchie Rodger, *Journal of Laryngology and Otology*, vol. xxxvi. No. 4. <sup>5</sup> *Ibid.* <sup>6</sup> Maybaum, *The Laryngoscope*, vol. xxxi. No. 4. <sup>7</sup> Dwight and Germain, *Boston Medical Journal*, 1920. <sup>8</sup> *Ibid.* <sup>9</sup> Kernan, *The Laryngoscope*, vol. xxx. No. 4. <sup>10</sup> Müller, *Zeitschr. f. Ohrenh.*, 1920. <sup>11</sup> Oppenheim, *Archives of Pediatrics*, 1920.

## TRANS-NASAL LARYNGEAL MEDICATION IN LARYNGEAL PHTHISIS.

By SIR JAMES DUNDAS-GRANT, K.B.E., M.D., F.R.C.S., Surgeon  
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Cancer Hospital, etc.

MR SEYMOUR JONES's ingenious apparatus for the introduction of medicated liquids into the larynx through the nose, as described in the February number of the *Journal*, reminds us of the value of the nasal passage as a mode of access to the larynx. I do not know whether this has been recognised and acted on as universally as it ought to be, but I have for the last ten years made it part of my practice, both in the hospital and in private. I have, however, used the simpler method which I find I made public in the *Clinical Journal* for 13th March 1912 (p. 367). "About half a drachm of an oily solution was poured by means of a small glass syringe into the patient's nostril while he was sitting up with the head thrown back, with the mouth open and gentle breathing carried on, any inclination to swallow being absolutely resisted by a voluntary effort on the part of the patient. A useful formula for the oil was eucalyptol, one part, oil of sweet almonds, nineteen parts, with sufficient methylene blue to colour it; the presence of the liquid in the larynx would be confirmed by means of the laryngoscope." The colloquial description of the *modus operandi* here quoted is probably quite clear. I would add, however, that the liquid must be injected slowly and that the penetration seems to be more certain if the patient's mouth is kept wide open. I can confirm from my own observations the beneficial effects of this trans-nasal medication as formulated by Mr Seymour Jones in his "conclusions."

For the suggestion of the method which I have described I am indebted to Prof. Lannois of Lyons. There is one point on which I would lay stress, namely, that by this method it is quite possible to get the liquid to pass below the vocal cords, and thus to act locally on the tubercular lesions which are so frequently found in the subglottic portion of the cord and which cannot be dealt with by brush or intra-laryngeal syringe without the intervention of the expert and not even then without considerable discomfort to the patient.

## Sir James Dundas-Grant

Mr Seymour Jones has referred to the occasional, though rare, occurrence of nausea. I had recently a case in which this was most distressing, but on the substitution for the eucalyptol and almond oil of a 1 per cent. solution of menthol in olive oil, the nausea became almost non-existent and the improvement in the symptoms most striking.

I may mention that my friend Mr Fred. Stoker has found the cough of influenza much diminished by the use of the menthol in olive oil through the nose.

Those to whom the method is not familiar will find it a valuable help in their practice, whether carried out by means of Mr Seymour Jones's auto-injector or the simple half-ounce glass syringe.



## MALIGNANT DISEASE OF THE NASAL ACCESSORY SINUSES.\*

By E. MUSGRAVE WOODMAN, F.R.C.S., Birmingham.

MALIGNANT Disease of the Nasal Accessory Sinuses is a subject which has hardly received the attention it deserves at the hands of our profession. Hovering as it does between the embrace of the pure specialist and that of the general surgeon—it is feared by both and blessed by neither. And yet it requires the intimate knowledge of the one combined with the surgical skill of the other.

The great vascularity of the parts—the delicacy of the tissues involved and the inaccessibility and danger to the deeper structures, alike render operative interference difficult. And yet it has a fascination of its own.

I do not propose to discuss the various operations which from time to time have been put forward, but I instance the paper by G. B. New in the last volume from the Mayo Clinic. In this record the destruction of the growth by the red-hot poker followed by radium is claimed to give good results. It is in itself sufficient to show what crude methods are still in vogue.

### DIAGNOSIS.

It is necessary for us to consider (a) The Diagnosis of Malignancy, and (b) The Diagnosis of the Extent of the Disease.

**(a) Microscopical Diagnosis.**—The question of malignancy is rarely in doubt, but the relative virulence of the growth is generally indicated by the microscopic slide. Fortunately in this area we have to deal with growths of mainly local malignancy. If partially removed they very rapidly recur, but do not usually disseminate. There is, therefore, time and opportunity for the surgeon to retrace his steps and to repair his omissions.

Squamous Epitheliomata arising primarily from the palate or gum are the most malignant, and tend to disseminate.

\* Paper read at the Section of Laryngology, Royal Society of Medicine, on 3rd March 1922, introducing the Discussion upon "The Treatment of Malignant Growths of the Nasal Accessory Sinuses" (see p. 297).

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There is a wide variation in malignancy in the growth of the air sinuses. Every grade is seen, from a highly malignant epithelioma and a soft vascular sarcoma down to neoplasms which are little better than infective granulation tissue. Which should be excised and which can satisfactorily be treated by radium or intensive X-rays? I would suggest that an epithelioma should always be excised, localised sarcoma treated by radium, and a diffuse pan-sinus myxo-sarcoma dealt with by operation or intensive X-rays or both. The microscopic nature of the growth should be considered in conjunction with the extent of the disease, and the surgeon's decision should balance accordingly.

**(b) The Diagnosis of the Extent of the Disease.**—This is important and deserves our most careful attention. Every case should be X-rayed — laterally, obliquely, and antero-posteriorly, and each possible seat of extension viewed seriatim.

*Frontal Sinus.*—In most cases of malignancy the frontal sinus is dull, but this is not necessarily due to direct extension; it is often due to the presence of pus and polypi from back pressure.

*The Sphenoidal Sinus* is seen very easily on a lateral X-ray, and should in all cases be opened up on the affected side.

*The Palate* is best examined by palpation, because the first sign of involvement is a softening from bone absorption, and this is later followed by fungation.

*Orbit.*—Proptosis is not by any means necessarily a sign of inoperability; nor is blindness, for this may be due to toxic absorption from septic ethmoiditis. Optic neuritis or atrophy is a sign of direct pressure and contra-indicates operation. Obstruction to the venous return, suggested by a reddened conjunctiva and dilated vessels, is a serious sign. Projection of the growth at the inner canthus of the eye, often considered a hopeless condition, is merely due to extension into the lachrymal sac.

*Meninges.*—No operation should be undertaken when a suggestion of meningitis is present. But this is often a temporary condition due to the absorption of sepsis from nasal obstruction and will yield to treatment. Lumbar puncture should be done, and the growth shrunk by cocaine and adrenaline and treated by nasal antiseptics; urotropin is given internally.

## Disease of Nasal Accessory Sinuses

Mrs B., aged 40, was sent to me complaining of nasal polypi. Her nose and antra appeared full of ordinary polypoid growths. On 3rd August 1920 these were removed. On microscopical examination they proved sarcomatous and clinically recurred within a week. On 20th August 1920 I performed a complete eradication of all the sinuses on both sides. On the following day she developed intense headache, pyrexia, and all the signs of meningitis, which lasted for a week. She recovered and is strong and well to-day.

*Pterygoid Fossa*.—Extension through the postero-external wall of the antrum into the pterygoid fossa is a condition seriously to be reckoned with. It is not shown by the X-rays, and can only be detected by palpation. The great vascularity and lymphatic connections of the pterygoid fossa are a serious factor.

What cases, therefore, of malignant disease in this area must be considered inoperable? It is perfectly evident that many patients who would a few years ago have been considered inoperable now come well within the range of operability, and it has to be remembered that there is a relatively low degree of malignancy to be dealt with. I would suggest that the following classes of cases are inoperable—(1) Sarcoma arising primarily from the base of the skull and secondarily involving the air sinuses; (2) Extensive involvement of the ptergo-maxillary fossa; (3) Cases showing signs of persistent meningeal irritation; (4) Extensive involvement of the orbit with a suggestion of invasion of the cavernous sinus, and in which, therefore, removal of the globe of the eye will not eradicate the disease.

### ANÆSTHESIA.

The question of anæsthesia is closely bound up with the technique of the operation, and the recent advances in this direction must be made use of.

The upright position has undoubtedly advantages—(1) The minimum quantity of anæsthetic is required; (2) There is no nasal congestion and the blood pressure in the head is considerably reduced; (3) Visibility is greatly improved and even photography is possible; (4) There is a remarkable absence of shock. These, I submit, are substantial advantages.

The technique now made use of is as follows:—Induction takes place by ethyl chloride and ether. When the patient is fully anæsthetised the mouth is opened by a gag, post-nasal

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plugs are inserted and the intra-tracheal catheter passed through the larynx under vision. An airway is inserted to provide for the expiratory vapours and the mouth packed around this tube with aseptic gauze. Finally, a sterile towel is tucked over the airway and fastened round the back of the head. By this means ether vapour is prevented from blowing into the surgeon's face and the stream of expired air is carried away under the towels. Anæsthesia is then maintained indefinitely by positive pressure supplied by an electric motor.

Intra-tracheal anæsthesia has two distinct advantages for this class of case—(a) There is no danger whatever of the inspiration of blood, and (b) Considerably less anæsthesia is required to keep the patient under.

During the last ten minutes, when stitching up, oxygen and pure air are blown in under pressure, and at the completion of operation the swallowing reflex should always be present. Chloroform is not given.

### OPERATIVE TECHNIQUE.

The incision commences above in the centre of the unshaved eyebrow, it is carried downwards midway between the bridge of the nose and the inner canthus of the eye and following the line of the lateral groove between the nose and the cheek—winds round the lateral ala to the philtrum of the upper lip which is divided vertically. The cut is then carried outwards through the mucous membrane of the mouth parallel with and about  $\frac{1}{2}$  in. above the alveolar margin. The whole cheek is turned outwards, but great attention is directed to the elevation of the periosteum on the outer side of the nose and around the orbit; the nasal bone and ascending process of the superior maxilla are stripped bare and the whole orbital periosteum, including the pulley of the internal oblique muscle, is elevated and turned outwards.

The cheek flap is turned outwards and held aside by a guide suture passed through the lip—it is swabbed with tincture of benzoin and covered and protected from infection by a gauze pad, which is sewn into position. The whole of the front wall of the superior maxilla and lateral wall of the nose are removed and the growth which is exposed to view is then removed, but owing to its friable nature and the numerous

## Disease of Nasal Accessory Sinuses

extensions present it is sometimes impossible to remove it without breaking it up.

The question of removal of the hard palate on the side affected is one for consideration in each individual case. In several instances of limited malignancy I have successfully left it intact and closed the mouth incision. In all cases of advanced malignancy the corresponding half of the hard palate should be removed: the opening can be immediately closed over by a denture and the facilities for thorough inspection of the nasal cavities, which the removal gives, present immense advantages. The soft palate should always be left intact if possible.

The extensions must be considered one by one. In all cases I remove the orbital floor of the frontal sinus and lay the infundibulum freely open. It is not safe to leave any of the ethmoid, and the whole of the anterior wall of the sphenoid should be removed together with the contents of the cavity. Lastly, the mesial wall of the sphenoid and the upper part of the septum must be carefully searched to eliminate the possibility of extension to the opposite side of the nose.

It is usual for the growth to have involved the posterior wall of the antrum and to have invaded the soft fat of the pterygo-maxillary fossa, and here a local recurrence from inadequate removal is most likely to be met with. Further, formidable hæmorrhage will be encountered from the internal maxillary artery. But in the upright position this vessel is easily picked up by curved tonsil forceps and owing to the elasticity of the tissues can be drawn out of the fat and tied. It is never necessary to send the patient back to bed with forceps *in situ*.

After syringing out the whole area, the cheek flap is replaced and sutured in position. This is a matter for care and artistic nicety. The principal points are fixed by silkworm gut sutures, and as many supporting catgut sutures as possible are carried through the periosteum on the inner side of the nose. This is of great importance. The skin is then approximated by a continuous silk stitch (preferably coloured for easy removal), and I am at present trying a catgut subcuticular stitch.

The lip is fixed in a slightly everted position to allow for contracture. A light packing is inserted soaked with tincture of benzoin and the patient sent to bed and placed in the Fowler position. The post-nasal plugs may be left *in situ* for twenty-four hours.

## E. Musgrave Woodman

There are certain points which we should discuss in connection with this technique:—

(a) **The Frontal Incision.**—The object of this incision is to remove the necessity of the infra-orbital incision which is generally practised. The latter I have abandoned owing to the very considerable and permanent oedema of the lower eyelid which results. The frontal extension, in connection with the removal of the naso-orbital wall, enables the eye to be drawn outwards and a full exposure of the orbito-ethmoid and fronto-ethmoid cells is given. Growth frequently extends directly backwards towards the orbital fissure and can only by this means be properly removed. The eye is subsequently replaced.

(b) **The Frontal Sinus.**—A considerable difference of opinion exists as to the necessity for opening up the frontal sinus. In many cases, and often unexpectedly, I have found the cavity full of malignant tissue—in all other cases I have found pus and polypi. I open it in every case that comes under my care. The frontal sinus is merely an extension of a nasal air cell into the frontal bone and an integral part of the nasal air cavities. Should we not treat it as such? There is a surgical rule for the treatment of malignant disease which can only be disregarded at our peril: the whole of the organ involved by malignant disease should, if possible, be extirpated. Should this rule not apply here? I can hardly describe the satisfaction which comes to the surgeon watching his case month after month, to know that every sinus on the affected side has been extirpated and its secrets laid bare. Any strange tissue can be seen and probed—any recurrence dealt with at once.

(c) **Cervical Glands.**—Should the glands of the neck be systematically removed? In growths of the air sinuses it is not usual for the glands to be involved, but in malignant disease of the alveolus or palate it is another matter. It is not possible to be sure which group of glands will be involved or even on which side of the face or neck they will appear.

Mr S., aged 20. Primary endothelioma of the septum. The only gland involved was the superficial parotid on the *opposite* side of the neck, and microscopically it resembled the primary growth.

In cases in which there is no palpable gland infection it is better to wait and see.

(d) **Ligation of External Carotid.**—Is it advisable to tie the external carotid artery as a preliminary to operation? There

# Disease of Nasal Accessory Sinuses

will be here considerable difference of opinion, but if the upright position is adopted there is absolutely no necessity to do this. The internal maxillary artery can easily be seen—caught up with forceps and tied. It is surprising how few vessels need a ligature and how small the loss of blood is—even when the vessel is not tied. I am quite sure it adds considerably to the difficulty which old people experience in the healing of their wounds, and in one of my cases the ligature led to sloughing of the cheek flap.

(e) **A Preliminary Laryngotomy.**—The procedure is unnecessary when this technique is adopted. A positive intra-thoracic pressure is maintained by the intra-tracheal anæsthetic and the pharynx can be packed off with mops and sponges so that no possibility of blood being sucked into the lungs remains. The operation is uncalled for.

## AFTER-TREATMENT.

A single thickness of gold leaf is placed on the skin incision and after the first twenty-four hours no other dressing is applied. The packing is removed in thirty-six hours and the various cavities freely irrigated. The whole of the inside of the cheek is covered with epithelial grafts as soon as possible and the bony surfaces kept clean.

All cases are subjected to X-ray treatment for at least a year.

**Recurrence.**—This occurs locally from time to time; it is always due to incomplete removal and can be remedied by opening up the wound and completing the eradication. Nature has given us a wide margin of safety. I would urge, and I make a great point of this, that it is better to operate even if the tumour recur than not to operate at all. Unlike malignant disease in other parts of the body, the recurrence is usually less serious and more easily dealt with than the original growth. The mortality of operation is very low.

**Deformity.**—If the palate and teeth can be left intact, careful suturing reduces the deformity almost to nil. The area on the outer side of the nose is the danger-point, as the skin wound is here unsupported by bone. Here all the help we can get from suturing the periosteum is required. If it breaks down an oval ugly hole is left which has to be repaired. A portion of the septum is swung up to act as a supporting structure and a skin graft applied.

## E. Musgrave Woodman

If the palate has to be excised there is a great tendency for deformity—the upper lip contracts and the cheek sinks in and œdema of the lower eyelid follows. These results can be entirely prevented by dental work. An impression of the mouth is taken before operation and again as soon afterwards as possible. A denture the size and shape of the lost upper jaw is provided and fitted with a hollow extension upwards into the antrum to maintain the cheek in the correct position. If the soft palate and uvula can be saved very little, if any, deformity of speech or deglutition results.

### CONCLUSION.

There is one operation described in all surgical text-books and widely taught to students which I hope will be condemned. I refer to excision of the superior maxilla. For growths involving the palate and alveolus only, it involves an unnecessary removal of the side wall of the nose and of the floor of the orbit. For growths of the antrum it is utterly inadequate and leaves the extensions into the frontal and sphenoidal sinuses untouched. I trust that this operation will soon be a relic of the surgical museums.

The requirements for our surgical work in this sphere are a sound surgical technique and an intimate knowledge of the anatomy of the air sinuses, their variations and abnormalities. Equipped with both, a great deal better and more effective work can and must be done for the treatment and alleviation of disease in this important area.

### DESCRIPTION OF PLATE.

- FIG. 1.—(*a*) The intratracheal tube; (*b*) the airway for expiratory return (this is normally covered by a towel, but is exposed for the sake of clearness); (*c*) the growth projecting from the nostril and the œdema of the eyelid.
- FIG. 2.—The cheek flap is turned back and the growth fully exposed prior to removal. Note the vertical position of the patient during operation.
- FIG. 3.—The operation completed by a continuous suture. Note the slight deformity present.





FIG. 1.



FIG. 2.



FIG. 3.



## CLINICAL RECORD

### BASAL-CELLED CARCINOMA OF THE LARYNX.\*

By WALTER G. HOWARTH, M.A., M.B., B.C. Camb., F.R.C.S. Eng.,  
Surgeon to the Throat Department, St Thomas' Hospital.

MRS D., aged 52, was sent to me in May 1921 by Dr Butler of Chiswick, with a history of hoarseness of varying degree over a period of two years, and with the note that there was an abnormal condition of the left ventricular band. There was no pain or dysphagia, and there had been a gain of two stone in weight during the past few months.

On laryngeal examination I found a bulging of the anterior half of the left ventricular band obscuring the surface of the cord and apparently preventing proper apposition on phonation. It was difficult to assess the degree of limitation of movement. The surface of the ventricular band was somewhat irregular but was not ulcerated, and the bulging gave the impression of being due to something beneath the mucous membrane. I made the suggestion at the time that it might be a lipoma.

On examination a month later by the direct method under an anæsthetic, the condition was found to be somewhat more extensive than was thought, and seemed to be involving the upper surface of the cord itself. The lump was very firm to the probe and the mucous membrane could not be moved independently.

On laryngo-fissure a further extension across the anterior commissure to the other side was revealed. Dr MacNab and Mr Ralston of Johannesburg, who were present, agreed that although the appearance of the tumour was very unusual the condition was probably malignant.

The whole of the left ventricular band and left vocal cord along with the anterior third of the right vocal cord were therefore removed wide of the growth. Bleeding was unusually violent and troublesome. The operation was completed in the usual way but the thyroid ala was not removed. Recovery was uninterrupted.

At the present time there is no sign of recurrence and the patient remains in good health with a very good voice. Considering the extent of the operation there is singularly little deformity in the larynx.

\* Case shown at the Section of Laryngology, Royal Society of Medicine, 3rd February 1922, under the title (?) "Endothelioma of Larynx."

# Walter G. Howarth

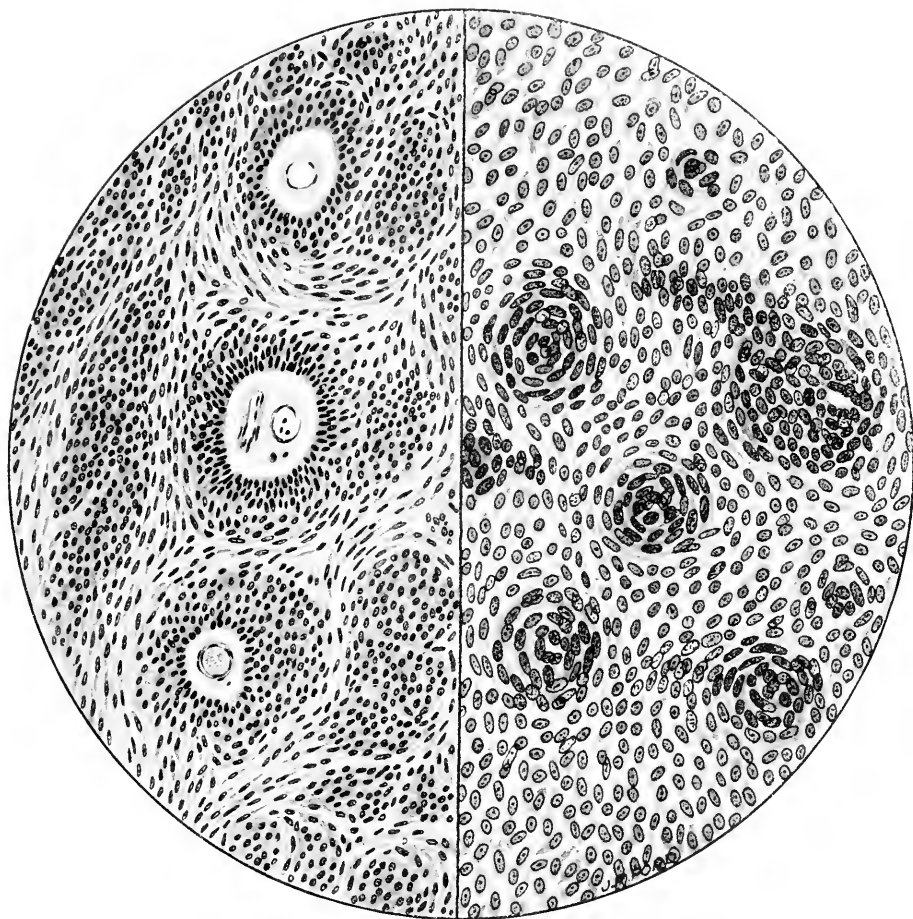
## HISTOLOGICAL DESCRIPTION OF THE TUMOUR REMOVED FROM THE LARYNX.

*By Professor S. G. Shuttock, F.R.S.*

The tumour is composed of voluminous, compact masses of cells traversed with many capillaries, the lumina of some of which are still filled with blood. The cells immediately around the vessels are differentiated from the general mass by the fact that they have a palisade arrangement, and are set radially to the lumen of the vessel: the cells adjacent to these, moreover, are usually more closely compressed than elsewhere. The capillary is in most instances separated by a narrow interval from the cells, as a result of shrinkage during the fixation of the tissue. With the capillary there is invariably associated a certain amount of delicate connective tissue. The elements which compose the rest of the cell basis are of a flattened form, devoid of any fibro-plastic elongation, and are arranged conformably with the vessels. In other situations the intervening cells are spheroidal, or furnished with short oval nuclei, and without any definite arrangement. When the more developed and voluminous masses are traced to their peripheral limits, the capillaries are seen to emerge into the adjacent connective tissue. The larger collections terminate in an undulating way, their outermost cells being of the same palisade or sub-columnar kind as those around the capillaries. Scattered in the general masses there are conspicuous whorls, or more compact groups of cells. These are clearly sections, tangential or other, of the more closely packed collections of cells immediately around the capillaries, the lumen of the latter having escaped exposure. Whether any are independent centres of cell proliferation, of a kind like the nests of an epithelioma, but wanting the development and flattening of the outer elements of the latter, I could not determine.

The peripheral growth takes place by the advance of solid cylinders and rows of cells into the spaces of the connective tissue: these groups increase and coalesce so as to surround and bury-in the capillaries. The whorls in the general mass do not become canalised to produce any kind of vessel: nor can they be referred to endothelial proliferation occurring in vessels once pervious.

**Remarks.**—Although the capillaries are ensheathed with cells somewhat as in a perithelioma, the want of cohesion



The left half shows two capillaries lying in a collection of flattened cells without any appertaining fibre, the peripheral or perivascular elements of which have a palisade arrangement.  $\frac{3}{8}$  obj.

In the right half is shown a portion of the general cell mass, in which lie some of the whorls referred to in the text.  $\frac{1}{4}$  obj.



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between the sheath and the vessel, and the fact that the capillaries are accompanied with connective tissue, and that more than one may be present, militate against classing the neoplasm as a perithelioma. It is, in fact, clear on studying the earliest stages of its advance that the capillaries become surrounded secondarily, and do not themselves furnish the ensheathing mass of cells.

The neoplasm is best regarded as a carcinoma which has arisen from the investing epithelium of the mucosa, and as belonging to the basal-celled or non-squamosal type. Many intact mucous glands occur in the section.

## SOCIETIES' PROCEEDINGS

### ROYAL SOCIETY OF MEDICINE—SECTION OF LARYNGOLOGY

March 3rd, 1922.

*President*—SIR WILLIAM MILLIGAN.

**Discussion on the Treatment of Malignant Growths of the Nasal Accessory Sinuses.**—Introduced by Mr MUSGRAVE WOODMAN, whose paper is published upon p. 287 of the *Journal of Laryngology*, June 1922.

SIR WILLIAM MILLIGAN (President) said that Mr Woodman attacked these growths in a very thorough manner ; it had been a revelation to him (the President) that it was necessary to do such extensive operations. He was particularly interested in the remark as to the extension of the growths to the frontal sinus. Amongst all the cases which he had had in the last five years at the Royal Infirmary, Manchester, in only one—carcinoma of the antrum—had there been, so far as he knew, extension to the frontal sinus. From what had been said, cases might have been overlooked. He had not opened and examined the frontal sinus in his cases, because he had had no reason to suspect it was involved. He asked for opinions as to the posture the patient should be in during the operation ; the parts were very much more accessible when the patient was seated in a chair than when lying down, and hæmorrhage more easily dealt with in the sitting position. One of Mr Woodman's fatal cases occurred before he adopted the sitting posture—the secondary pneumonia, no doubt, being due to blood having entered the air passages.

Another point was as to whether or not it was desirable to tie the external carotid artery. His practice had been to do so, as he felt there was a greater freedom from hæmorrhage. He had not seen sloughing of the flap as a result.

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He thought it would be generally agreed that some other operation should be done before resorting to the extreme procedure of excising the upper jaw. Moreover, it was an incomplete operation for the purpose, for it often failed to accomplish what it was intended to effect. He was inclined to think that the technique followed by Mr Woodman would go a long way towards abolishing that particular operation.

Mr W. STUART LOW supported Mr Woodman in not ligaturing the external carotid artery. He was surprised to learn that the growth had been found in so many cases to have extended to the frontal sinus. It had not been his (Mr Stuart Low's) practice to open it, yet his patients had recovered. He joined in the condemnation of excision of the upper jaw for these cases. He was in favour of the canine fossa route in preference to the facial operation, because a repetition of the operation was often required; and this, when done through the facial scar, led to bad cosmetic results such as were seen in some of the patients shown that day, with large permanent openings in the face leading into the nose and antrum. By the antral route all risk of facial blemish was avoided. He recommended vaccines to lessen sepsis, sloughing, and fætor, which were the accompaniments of the cancer cases, the swabbing of the raw surface with chloride of zinc, and post-operative application of X-rays.

Mr J. F. O'MALLEY remarked that until recently the treatment of malignant growths of nasal accessory sinuses fell to the lot of the general surgeon, and were usually classified amongst tumours of the upper jaw. The condition was rarely detected until there had been extensive invasion of orbit, palate, and face. Up to 1916, when Sir St Clair Thomson published his paper on "Moure's Lateral Rhinotomy Operation," he had taken a depressing view of these cases; since that date he had operated upon four cases—three sarcomata, one carcinoma—by this method. Two of the sarcoma cases were still doing well; the third, a myxosarcoma, had a slight recurrence, which was being treated by radium, and he hoped to show the case later on. The carcinomatous case was a failure, and died a few months later: he could not get beyond the limits of the disease, possibly because the operation was not extensive enough.

Mr W. M. MOLLISON said his experience had been in seventeen cases only, three of them sarcomata. The carcinomata were mostly basal-celled—one was columnar, one spheroidal, one squamous. He had carried out operative technique only, and was guided in his incision by the position and extent of the growth. If it was antral, he employed a Ferguson's incision, but not always going completely through the lip. If it was ethmoidal, Moure's incision gave very good approach to the fronto-ethmoidal region, and the operation left practically no scar. He followed, more or less, the technique which Mr Woodman had described, removing in each direction, including, if necessary, the floor of the orbit, paying particular attention to the malar region—in which recurrence usually took place—and going right back through the ethmoid and exposing the sphenoid. He did not agree that the frontal sinus was often invaded by growth, though that sinus was always suppurating; there was pus in all the sinuses, even if there was no growth. In only two cases did he find



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growth penetrating the frontal, and in two the sphenoidal sinus. Intratracheal ether was essential in these cases, since blood did not pass into the air passages. Only one of his patients died from shock two days after operation—a female, aged 80. She had extensive growth, and it was necessary to remove her palate, which rendered the prognosis worse. If the palate could safely be left behind, there would be rapid recovery, and no operative shock. He had found recurrences much sooner than Mr Woodman's remarks would lead one to expect. In only one of his (the speaker's) cases was there absence of recurrence after eight years, the average freedom from recurrence after the operation being about a year. In one case of carcinoma of the ethmoid it was necessary to remove the whole ethmoid, and, while this was being done, the dura mater was damaged, and there was an escape of cerebro-spinal fluid. He applied carbolic to the torn dura mater, and the patient made a good recovery. He advised ligaturing the carotid in these cases, since the bleeding was less than when it was not ligatured. He had not found subsequent sloughing of the flaps, except when the growth was very near the skin of the face, and this accounted for the sloughing.

Mr NORMAN PATTERSON said he was much impressed by the technique suggested by Mr Woodman. He (Mr Patterson) made a practice of tying the carotid in every case, and he had never had serious sloughing of the flaps. It greatly limited the bleeding and made the operation much easier, for the tumour could be more readily defined. He did not regard opening the frontal sinus in every case as the correct treatment. Some growths were limited to the lower part of the antrum, and in some cases the orbital plate and the ethmoidal cells were not involved. In these circumstances it would be a mistake to open the frontal sinus, and there was always the risk of implanting malignant cells in the tissues. In one case he had performed an extensive operation on the antrum and ethmoid, and a malignant growth subsequently developed in the frontal sinus. In some cases one could not get beyond the limits of the tumour; he then curetted out all the growth he could and afterwards used the diathermy button. When the floor of the nose was not involved, and a portion of the hard palate had to be removed on account of the disease having invaded the antral floor, it was best to make the incision through the palate to one side of the mid-line, so as to leave the incisor teeth. This was more important in the case of women. He had seen cases in which the soft palate had been torn away, although not diseased; that was a mistake. An artificial roof to the mouth could be supplied, but not a functioning soft palate. He always used intratracheal ether. He thought nearly all sarcomata and endotheliomata should be subjected to some form of ray treatment, either radium or X-rays, or a combination of both, before the patient was submitted to an operation. Many sarcomata would almost melt away under ray treatment, but carcinomata, especially epitheliomata, did not, as a rule, respond at all to it.

Mr DOUGLAS HARMER reported on fifteen cases of epithelioma of antrum, two cases of columnar-celled carcinoma of ethmoidal region, and one case of spheroidal-celled carcinoma of outer nasal wall involving antrum. Inoperable cases were not included. Males, ten; females,

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eight. Under 40, two ; under 50, two ; under 60, three ; under 70, nine ; under 80, two.

Seven cases of endothelioma. Males, two ; females, five. Under 40, one ; under 50, one ; under 60, two ; under 70, two.

Two cases of sarcoma. Females, two ; under 45.

Total cases, twenty-three, with two deaths: one from meningitis and one from septicemia after radium. The low mortality was due to the performance of preliminary laryngotomy and plugging of pharynx which prevented blood getting into the air passages. These figures should be compared with Butlin's results, which showed nearly 30 per cent. mortality from operation. With very vascular tumours the question of preliminary ligature of the external carotids should be considered.

Of the eighteen cases suffering from carcinoma and treated by excision only two were known to have lived for more than three years without a recurrence. Of the seven cases of endothelioma treated by the knife, one had remained well for five years, when a second operation was performed, and no recurrence occurred for five more years. This patient had then been treated by radium two years previously and was still living. A second case had had an early recurrence after removal of the maxilla and glands of the neck, but had lived for eight more years after treatment with radium. In the other five recurrence had taken place within one year of operation, but the patients' lives were prolonged with radium treatment.

CONCLUSIONS.—The importance of early diagnosis could not be too strongly emphasised. On the other hand, localised growths which had been freely excised often recurred rapidly *in situ* because the wound had been reinfected at the time of the operation. There was no evidence that this accident could be avoided by removal of the entire maxilla, and whenever possible a partial excision was preferable, *e.g.*, Moure's operation. In cases of carcinoma, simple excision of the jaw had not given satisfactory results. His (Mr Harmer's) best cases had been those which were treated by excision followed by diathermy and radium. Radium alone was of little value for carcinoma and only retarded the disease. Endothelioma also showed a great tendency to recur although the growth was often encapsuled. Tumours of this nature should be treated either by radium followed by excision where necessary, or by excision, diathermy and radium. Sarcoma should be treated by radium in the first instance, or by diathermy and radium. After treatment by diathermy or radium it was often necessary to operate for removal of sequestra. Later, a plastic operation might be necessary to repair deformity. To prevent recurrence it would seem advisable to keep all these cases under X-ray treatment for one to two years. The rare cases which were complicated by involvement of the glands seldom responded to any form of treatment.

Mr Harmer said he did not agree with Mr Woodman's views on recurrence. He considered a recurrence always a very serious matter, and the prognosis in any form of operation thereby made worse.

Mr A. J. M. WRIGHT suggested that something might be done in the way of preventive treatment, particularly of carcinoma of the nose and accessory sinuses. He had been impressed by having had, during the last six months, three cases of carcinoma involving the antrum and ethmoid, in

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all of which there was a clear history of old-standing chronic suppuration. That might be a frequent precursor of cancer in this region, as it was known to be so in other parts of the body. Had other members noticed the same thing? If so, it constituted a strong argument for dealing thoroughly with chronic suppuration of the sinuses. He supported Mr Harmer in advocating laryngotomy in these cases.

Mr WALTER HOWARTH said that some of these malignant tumours were very slow-growing and amenable to operation, while others were of very rapid growth and soon recurred. He agreed with Mr Patterson as to the great value of irradiation of sarcomata before operation. Though carcinomata were supposed not to be amenable to radium, he had had a case of extensive carcinoma involving the antrum and ethmoid and side of the nose, apparently hopeless, and it disappeared under radium treatment as if by magic, as in the case of round-celled sarcoma. Therefore the fact of a growth being squamous-celled carcinoma was not necessarily a contra-indication of preliminary irradiation. He practised Moure's modified incision, with extensions as required by the particular case. He was opposed to the set operation of removal of the upper jaw, as it gave a very poor approach to the seat of disease, *i.e.*, to the ethmoid and back of the nose. He had not had time to make a statistical survey of his cases, but he could say that his best cases had been those of round-celled sarcomata. In one such case, operated upon by this method, the patient was alive after four years. Another patient, a case of chondrosarcoma, was still alive five years after operation.

Mr E. D. D. DAVIS said that, in view of present-day knowledge, the only successful treatment of malignant disease of the nose was complete excision, therefore an early diagnosis was essential. This Section could render valuable assistance by promoting early diagnosis. He operated with the patient in the semi-recumbent position. He now used intra-tracheal ether, but in his first few cases he had performed laryngotomy. The patients undergoing laryngotomy did not make such a quick recovery, and the shock of operation was greater. He considered ligaturing the external carotid unnecessary, and made no difference in the amount of hæmorrhage. The growth must be thoroughly exposed and freely excised irrespective of anatomical structures and, if necessary, the eyeball should be sacrificed. He did not see how thorough exposure could be obtained by the antral route, particularly as some of the carcinomata were adherent to the eyeball and invaded the floor of the orbit.

His experience with radium and X-ray applications had been very unsatisfactory. Radium had been advocated for vascular sarcomata, and he agreed that after exposure to radium such a tumour would rapidly disappear, but it would return just as quickly. He had exhibited such a case, a man, now dead, who had been exposed to 500 mg. of radium, but the sarcoma returned. He had yet to hear of the disappearance of a malignant growth by radium treatment in which the patient had been free from recurrence for more than two years. The only hopeful course was early diagnosis and complete excision.

How soon was it safe to operate after X-ray and radium exposure?

Sir ST CLAIR THOMSON limited his remarks to the Moure operation

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of lateral rhinotomy introduced by Moure (Bordeaux), and the results he (the speaker) had obtained. With a series of lantern slides he showed that one lateral incision from the glabella down to the side of the ala nasi, but without entering the nostril, was sufficient to gain free access to all the accessory sinuses. In his cases the frontal sinus was never invaded, though the fronto-ethmoidal cells as well as the sphenoid were frequently diseased. Another reason for thinking that the frontal sinus was rarely attacked was that in recurrences—which were only too frequent—the frontal sinus was seldom involved. He referred to his article published in the *Lancet* for 13th May 1916, and said that the patients in two cases there described and illustrated were still alive and well, and absolutely free from recurrence. The first case was one of endothelioma of the ethmoid and antrum, operated on twelve years ago. The second was an epithelioma of the antrum and ethmoid, operated on ten years ago. Both cases were in ladies and the scar was hardly perceptible. In neither case was there any glandular infection, the carotid was not tied, and there had been no treatment by X-rays, radium or vaccines. In view of such a record he thought that surgery need not yet give way to the red-hot poker.

MR HERBERT TILLEY thought the procedure recommended by Mr Woodman was particularly useful for the more extensive cases. In his last twelve cases he (the speaker) had approached the growth from underneath the lip and cheek and turned up the latter; this gave extraordinary room and a clear view of the antrum to the floor of the orbit, as well as of the ethmoid cells and sphenoidal sinus. On conclusion of the operation the cheek was replaced and one or two stitches inserted in the mucous membrane, and the patient did not appear to have undergone any operation. He had never ligatured the external carotid in these operations and he favoured preliminary laryngotomy. He operated with the patient in the semi-prone posture.

MR A. J. HUTCHISON asked whether radium had any effect on vision. The patient he exhibited that day had had slowly failing vision on the affected side, but following application of the radium he immediately became blind in that eye.

MR JOYCE (Birmingham), introduced by Mr Woodman, spoke of the success with which Mr Woodman had operated upon a relative of his with bilateral disease, and he had been much struck by the clear exposure obtained, and the slight accompanying hæmorrhage controlled by ligaturing the bleeding points. The patient was under the anæsthetic three hours thirty-five minutes, the operation having taken three and a quarter hours. Only quite an inconspicuous scar resulted.

DR N. S. FINZI said the whole question of the ray treatment of malignant growths depended on giving to every cell of the growth a lethal dose of whatever rays were being used. That dose varied in the case of each kind of growth, and this was the reason of success with sarcoma, and not with carcinoma. The lethal dose for round-celled sarcoma was less than for spindle-celled or myxosarcoma; hence the best results from rays were obtained in round-celled sarcoma—indeed, for those he thought ray treatment would replace surgery. In epitheliomata the results from rays were worse than for spindle-celled sarcoma and endothelioma.

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Another factor which affected the treatment of these cases was that of sepsis. These growths were all septic at first. It did no harm to give an aseptic growth considerably more than the lethal dose, provided this did not set up infection. There was great harm in giving more than the lethal dose to a septic growth, and failure to cure was the result. He referred to the Erlangen treatment, a modification of our methods of using the X-rays. It aimed at getting a sufficient dose of highly penetrating rays to every cell of the growth, and the latest methods aimed at sterilising septic growths first, starting off with the introduction of copper ions and doing a very extensive ionization of the whole ulcerating surface. Next day an intense measured dose of rays was given, with the aim of giving every cell a lethal dose. The irradiation was repeated in six weeks, if the blood condition permitted it; for a heavy radiation damaged the blood cells considerably, and a second repetition in another eight weeks was often advisable.

Treatment of recurrences was not so satisfactory as the treatment of primary growths which had been untouched by surgery, as surgery damaged the blood and lymph supply to the area; and, perhaps, the patient's resistance was less at the time the recurrence took place. Still, even in recurrences radiation gave relief, and the growth might disappear for a considerable period.

Intensive X-ray exposures precluded operation for a month or so afterwards, as those exposures damaged the skin considerably. He did not think radium affected the eyesight directly; he was often treating cases of rodent ulcer quite close to the eye; in only one case had he seen any effect on the retina, and that was merely transitory. Radium attacked the more highly specialised cells much less than the primitive cells; hence, as one would expect, the retinal cells were about the last to be attacked by it. Damage might result from the swelling caused by the radium in a growth in close proximity to the eye or optic nerve.

Sir WILLIAM MILLIGAN (President) in summing up the discussion, said members seemed, on the whole, to favour the tying of the external carotid, though it was not absolutely necessary. The general opinion was that these growths did not extend usually into the frontal sinus, though pyogenic infection of that sinus was common. Of twenty-three cases of his own in only one was there definite extension to the frontal sinus.

There was a difference of opinion as to the value of the laryngotomy tube and intratracheal ether; he had been surprised at nobody having mentioned Kühn's intubation tube, as he had found it very useful in these circumstances; he favoured either using this tube or performing a laryngotomy.

He thought surgeons were not sufficiently in the habit of irradiating the tissues beforehand, as well as after the operation. He was sure it was important to remember what Dr Finzi said as to studying the kind of growth and trying to get in the particular lethal dose.

There was also considerable difference of opinion as to what was the best method of approach; also whether the incision should be as extensive as that used by Mr Woodman or as that introduced by Moure. The disease in question was one which would be fatal unless thoroughly dealt with; hence there must be free access, and, provided life could be saved,

## Abstracts

disfigurement was a secondary matter. He admitted that Moure's lateral rhinotomy gave a wonderful view, but not so good as that from a combined Killian and Ferguson.

Mr WOODMAN (in reply) claimed that he had great regard for leaving the minimum of blemish after the operation, but it should always be remembered that in these operations the first claim was upon the life of the patient. If the subsequent suturing were done carefully, and followed by applications of X-rays and massage, good cosmetic results would ensue.

Scarcely any members had expressed agreement with him as to opening the frontal sinus; but if it were systematically opened, it would be found to be diseased in 90 per cent. of cases, though not with malignant growth—in two of his cases that sinus was full of growth. Many contained polypi and pus, and these were factors which probably preceded malignant disease. Such growth did not extend through the forehead, but downwards, and appeared at the inner angle of the orbit, where recurrence was frequently seen.

If malignant disease was to be successfully attacked, why not, in these cases, open and examine each one of the sinuses seriatim?

He had never irradiated before operation, but he could understand its advantage. He always applied X-rays afterwards. He did not think those who had tried intratracheal ether would go back to laryngotomy. Ether was of great advantage to the patient, was rapidly thrown off, it had no effect on the kidneys, and was not a protoplasmic poison; whereas after chloroform there was often acidosis.

A number of cases illustrating treatment of malignant growths of the accessory sinuses were shown at the Meeting by Mr Musgrave Woodman, Dr Douglas Harmer, Mr Bedford Russell, Dr Dan M'Kenzie, Mr T. H. Just, Mr Norman Patterson, Mr A. J. Hutchison, and Mr F. J. Cleminson.

## ABSTRACTS

### PHARYNX AND NASOPHARYNX.

*Acute Necrotizing Tonsillitis, Pharyngitis, and Laryngitis in Influenza.*

MAX MEYER (Wurtzburg). (*Archiv. für Laryngol.*, 1921, Band 34, Heft 1, p. 1.)

The cases described very fully in this paper are examples of what most of us regard as gangrenous pharyngitis. The general features are local inflammatory obstruction to respiration and the formation of false membrane, with intense general septic intoxication with heart failure. The chief bacteriological irritant is the streptococcus, which exercises its sway while the reactional power of the system is reduced by the influenzal poison. The presence of the false membrane generally leads to a diagnosis of diphtheria. Tracheotomy is often performed without avail.

JAMES DUNDAS-GRANT.

# Pharynx and Nasopharynx

*Unhealthy Tonsils and Cervical Adenitis.* W. G. HOWARTH  
and S. R. GLOVNE. (*Lancet*, 1921, Vol. ii., p. 997.)

The authors give the results of a research undertaken with a view to inquiring into any possible relationship between enlarged palatine tonsils and cervical adenitis. Their results may be summarised as follows:—Five per cent. of unhealthy tonsils associated with enlarged cervical glands showed histological lesions of tuberculosis, and 2 per cent. contained tubercle bacilli. Positive results were not obtained by injecting large quantities of tonsillar tissue into guinea-pigs, possibly because (1) the bacilli were lost in centrifugation; (2) the lymphoid tissue had dealt with them effectively; or (3) the bacilli were of low virulence (? bovine). The chain of events in cervical adenitis with large tonsils is suggested to be (a) enlargement from chronic septic absorption, followed by (b) cervical adenitis due to toxæmia; and (c) implantation of tubercle bacilli on the already unhealthy tonsil, with (d) subsequent absorption of bacilli along the lymphatics from tonsil to glands. This being the case, removal of the tonsil as a therapeutic measure is obviously correct, and evidence tends to prove that proper enucleation results in disappearance of the enlarged glands. When breaking down in the glands occurs, aspiration with a suitable syringe is all that is required.

MACLEOD YEARSLEY.

*Pulmonary Abscess in Adults following Tonsillectomy under General Anæsthesia.* LEWIS FISHER, M.D., and A. J. COHEN, M.D. (Philadelphia). (*Journ. Amer. Med. Assoc.*, Vol. lxxvii., No. 17, 22nd October 1921.)

Pulmonary complications, measured by the possibility of fatal issue, are of greater importance as post-operative sequelæ than hæmorrhage or otitis media. Lung complications are much more frequent than the literature records. Seventy-six cases, many of them fatal, have been reported by United States operators since 1912, when Richardson reported the first case; seventy-four of the seventy-six patients were operated upon under general anæsthesia, ether probably being used in all cases. The favourite site of the lesion was the right lung, either the middle or the lower lobe being involved.

(1) *Type of Anæsthesia.*—Almost all cases occurred under general anæsthesia. The anæsthesia *per se*, can not alone be the cause, otherwise it would occur often in prolonged general surgical operations. Two cases are reported by Porter following local anæsthesia, but he states they occurred in patients definitely tuberculous.

(2) *Aspiration of Blood, Mucus, or other Detritus.*—Several operators are quoted who insist that the mouth should be placed lower than the larynx in operating. The authors, however, do not regard aspiration as a frequent cause of lung abscess.

## Abstracts

(3) *Infective Emboli*.—The most frequent cause, excepting pneumonia, of *non-operative* cases of lung abscess, is infarction by infective emboli carried from distant parts of the body. Norris and Landis found that 61 per cent. of cases were due to emboli brought to the lungs through the circulation. Having regard to the close association between the lung and the pharynx as shown by Wood and others, and the septic condition of the operated tonsil, it would appear that the embolic hypothesis gives the most likely and probable explanation.

(4) *Faulty Technic, especially Undue Traumatism*, e.g., length of time consumed in the operation, unnecessary crushing and laceration of tissue and the improper position of the head favouring aspiration.

(5) *Use of Motor-driven Ether vaporising Apparatus*.—This is dismissed as probably unworthy of consideration.

(6) *Antecedent Causes, either Local or General*.—Chronic bronchitis, virulent infection in the operative field, such as Vincent's angina, peritonsillar abscess, or general debility, undoubtedly act as predisposing factors.

The authors refer to the thousands of cases of tonsillectomy under local anaesthesia without a single complication in the lung and this convinces them that the general anaesthetic either acting directly or indirectly is the determining factor in the causation of lung abscess following tonsillectomy.

PERRY GOLDSMITH.

*Gangosa*. Dr ARROWSMITH. (*Laryngoscope*, Vol. xxxi., No. 11, p. 843.)

An ulcerative condition of the nose, palate, pharynx, and skin surfaces of the body, of unknown cause, destroying cartilage and bone, and causing much deformity. It occurs in Guam, the Ladrones, Caroline, Batanes, and Fiji Islands, Murray Island, Panama, British Guiana, Ceylon, Nevis, Dominica, and Equatorial Africa. There are no signs or symptoms of syphilis, and it is not leprosy, epithelioma, nor tuberculosis. The disease is painless, and progresses slowly over a period of from ten to thirty years, with periods of advance and quiescence. It is seldom fatal and most cases recover, though with great disfigurement. The author's case is the second undoubted instance occurring in a white man. It was diagnosed as syphilis in spite of negative Wassermann (blood and cerebro-spinal fluid), but antiluetic treatment was ineffective. All treatment was useless, and the destruction of bony tissue was enormous, and the odour very offensive. The histological structure in general suggests a low grade chronic granulomatous inflammation with some areas of acute exudative inflammation.

ANDREW CAMPBELL.



# Larynx

*The Mechanical Function of the Tonsil.* Dr R. B. FAULKNER, Pittsburg, Pa., U.S.A. (*Archives Internat. de Laryngologie, etc.*, January 1922.)

The author considers that the principal function of the tonsil is mechanical, and he compares it to the cartilaginous skeleton of the larynx. It affords a mobile insertion for the muscles of the pharynx. Its position, tension, and dimensions can be modified and this modification is essential for the finer vocal variations. Many authorities are quoted to support the view that it is an organ essential for singers. After removal of the tonsils there is *always* [author's italics] a permanent loss in quality, charm, and all the finesse of song.

"The palatine tonsil has no known or proved physiological function: its protective function has not been proved. It has no power of absorption, it is not a menace to the body. It is an important organ from the mechanical and phonetic aspect."

E. WATSON-WILLIAMS.

## LARYNX.

*Atypical Thyrotomy for Tuberculoma mistaken for Neoplasm.* Prof. JACQUES, Nancy. (*L'Oto-rhino-laryngologie Internationale*, December 1921.)

The patient was a man of 67, emaciated, complaining of hoarseness for a year, and of aphonia for a few weeks. Indirect laryngoscopy showed a greyish tumour, apparently ulcerated, below the cords. The appearances suggested malignant disease, despite a history of pleurisy three years previously. Thyrotomy was performed under local anaesthesia. The tumour was found to be cauliflower in type, about the size of a hazel-nut, and with an extensive base. The mucous membrane posteriorly was seen to be rugose, a fact not recognised at the time of examination, and this threw a doubt on the diagnosis. Nevertheless, the anterior part of the cords was resected along with a portion of the cartilage. The thyroid cartilage was sutured, leaving a small passage for the introduction of radium if necessary. Pathological examination, however, showed the growth to be tubercular in nature. The operation was followed by great benefit to respiration.

GAVIN YOUNG.

*Cancer du Larynx: Importance d'une Classification.* ST CLAIR THOMSON. (*Annales des Maladies de l'Oreille et du Larynx*, No. 2, Fév. 1922.)

Classifications in medicine are necessary, but they are necessary evils. Amongst useful classifications there is none which is more helpful than the one suggested by Isambert and Krishaber when

## Abstracts

they made the broad distinction between extrinsic and intrinsic cancer of the larynx.

The writer suggests the following groupings:—

*A.* Intrinsic cancer of the larynx.

*B.* Subglottic cancer of the larynx.

*C.* Extrinsic cancer of the larynx.

(The term "Mixed Cancer" may be used for cases of advanced disease, where the point of origin can no longer be determined.)

*A.* Intrinsic cancer is the most commonly met with. With rare exceptions it originates from a vocal cord, and from the anterior half.\* As hoarseness is a constant and early symptom the disease should be diagnosed in good time. The disease advances very slowly; the glands are not invaded until a late stage. Operation by laryngo-fissure gives more lasting cures than can be claimed for cancer in any other internal region of the body. Recovery from operation is rapid, and statistics show 80 per cent. of permanent cures.

*B.* Subglottic cancer is the rarest form of laryngeal epithelioma. It begins just below the anterior half of the vocal cord. The symptoms at first are slight and even variable. Inspection and diagnosis are difficult. Partial or complete laryngectomy, with removal of the cricoid cartilage, may be required. The prognosis is not nearly so promising as in true intrinsic (chordal) cancer.

*C.* Extrinsic cancer originates along the upper margins or posterior surface of the larynx, *i.e.*, it may spring from the epiglottis, the ary-epiglottic folds, the arytenoids, the pharyngeal surface of the cricoid cartilage, or the sinus pyriformis. It is met with more commonly than Group B, but not so frequently as true intrinsic cancer. Symptoms, progress, diagnosis, and treatment will vary considerably according to which of these regions is the original seat of origin. In all of them the early symptoms may be so vague or negligible that the disease is often advanced before it comes under observation. The glands are infected early in the disease. Progress is rapid. Many cases are quite inoperable. Some can be saved by lateral pharyngotomy. Operation on the glands may be required. For most a more or less complete laryngectomy is necessary. The operation is difficult; trying to both surgeon and patient; it is not free from danger. The results—if all cases were published—would show many catastrophies connected with the operation, and many recurrences after it. Even in successful cases, the loss of a useful voice, and the social disability connected with breathing through the neck, is in marked contrast with the results obtained by laryngo-fissure when the disease is of the intrinsic class.

ST CLAIR THOMSON.

\* St Clair Thomson, "Intrinsic Cancer of Larynx: Usual Site of Origin," *British Medical Journal*, 25th June 1921.

# Larynx

*Cancer of the Larynx.* ST CLAIR THOMSON. (*The Laryngoscope*,  
July 1921.)

This article was written for the twenty-fifth anniversary number of the *Journal* in which it is published, and it is interesting from the historical picture it paints of this subject as it stood in the last quarter of last century, and as it stands now in the first quarter of the twentieth century. Morell Mackenzie wrote, only forty years ago, that "as far as the present state of our knowledge extends, the only possible termination of any case of cancer is death. . . . The usual duration of epithelioma of the larynx appears to be about eighteen months." John Nolan Mackenzie, of Baltimore, says: "When I look back through the years in which I have seen cancer of the larynx maltreated, and in which I have unconsciously maltreated it myself, I am simply appalled at the retrospection."

Then came the courageous efforts of the pioneers. Billroth of Vienna was the first to perform a complete laryngectomy. But of the first 25 cases of total extirpation performed by various surgeons, not a single patient was alive at the end of the first year after operation. The change in our days, as well illustrated by the 6 cases shown by Charters Symonds at the 1890 Summer Meeting of the Section of Laryngology,\* are largely the result of the brilliant idea of Solis Cohen when he proposed to cut across the trachea, detach it completely from the larynx, and fix the orifice to the skin in the middle of the neck.

As regards laryngo-fissure, the successes which now attend it are, according to the writer of this article, chiefly due to the prescience and boldness of two English surgeons, Arthur Durham of Guy's and Butlin of Bart's, although as long ago as 1867 Solis-Cohen of Philadelphia had performed it on a patient who survived for twenty years, and then died of apoplexy. But most of the early efforts met with heart-breaking disaster. The first 8 cases of laryngeal cancer treated in Europe by laryngo-fissure were operated on between 1870 and 1884. Six died of recurrence, one survived two years and nine months, and the eighth was lost sight of. Paul Bruns recorded 19 cases, of which only two survived a year; Morell Mackenzie, in 1880, wrote that "the results of thyrotomy are extremely unsatisfactory." Nevertheless three of the laryngologists who at first condemned the operation afterwards achieved brilliant results with it. Thus, in 1883, Butlin categorically stated that "not the slightest encouragement is afforded by public accounts to induce one to perform the operation of thyro-fissure."

Since 1890, when Butlin limited laryngo-fissures to intrinsic cases, the perfecting of the operation and the brilliant results are well known.

\* *Journal of Laryngology*, xxxv., 1920, No. 9, p. 257.

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The writer of this paper can record 50 cases without an operative death, and with lasting cures in over 80 per cent. Such results, as Mackenty says, are only obtained by meticulous care. As Chevalier Jackson points out, "the operable cases are extremely rare." There are not enough to allow of every laryngologist becoming an adept at treating them. "These cases," says Jackson, "should be sent to a few men in each large centre who may thus have a collective experience."

ST CLAIR THOMSON.

## PERORAL ENDOSCOPY.

*Congenital Atresia of the Œsophagus.* I. SETH HIRSCH, M.D., Director, Roentgen-Ray Department, Bellevue Hospital, New York. (*Journ. Amer. Med. Assoc.*, Vol. lxxvi., No. 22, 28th May 1921.)

CASE I.—Patient vomited everything since birth and passed only meconium by bowel. Fluoroscopic examination—a soft catheter did not pass beyond a point above the level of the arch of the aorta. The œsophagus appeared to end as a blind sac at this point. Gastrostomy was followed by death four hours later. Post mortem showed the œsophagus patent to the level of the fourth dorsal vertebra, where it ended blindly in a dilated pouch. From there it was continued as a fibrous band to within about 1 in. of the stomach, where it again became a patent tube.

CASE II.—For the first three days of life the child vomited everything. A catheter could be passed into the œsophagus only for a distance of 4 in. from the gum margin. X-ray examination disclosed a moderate dilatation of the gullet just above the aortic arch. As the sac became distended there was severe coughing, followed by the expulsion of some of the bolus. The trachea and bronchi were clearly outlined on the screen and the point of actual fistula could be demonstrated. Gastrostomy was performed but the child died the next day. No *post-mortem* was held. A very comprehensive review of the literature is appended.

PERRY GOLDSMITH.

*Tracheocele: the Endoscopic Aspect.* Dr J. GUISEZ. Illustrated. (*Bulletin d'Oto-Rhino-Laryngologie*, Paris, November 1921.)

The author relates how endoscopy has revealed the nature of these air-containing swellings of the neck. Hitherto they have been considered hernias of the mucosa between tracheal rings. This condition does occur after labour but rapidly subsides. The true tracheocele represents a rupture of the whole tracheal wall. The onset may be sudden, with a muscular effort, but is usually gradual without definite

## Peroral Endoscopy

history: they tend steadily to increase. Guisez gives the history of 2 cases. (1) The patient (aged 23) was blown up in battle (? made a violent effort with closed glottis). Immediately there was great swelling of the neck, pain, dyspnoea, and slight blood-stained expectoration. Diagnosis, rupture of the trachea, surgical emphysema: no external wound. Two years later, at rest, the neck showed slight central swelling: the gap in the left side of the trachea could be palpated. On the least exertion a soft swelling appeared in front and to the left of the trachea extending from larynx to sternum. By endoscopy, in quiet respiration the left cord was seen above a smooth red subglottic swelling which extended into the trachea. It was readily compressible by the examining tube, and showed pulsation, communicated from the carotid. On expiring with the tube blocked, it disappeared, and the swelling in the neck became visible. (2) The second case showed similar appearances. The patient (aged 56) said he had had it all his life.

Dr Guisez considers the prognosis serious; although progress may be slow it is steady. Low tracheotomy alone relieves.

E. WATSON-WILLIAMS.

*Spasmodic Closure of the Lower End of the Œsophagus (so-called Cardio-spasm).* Dr L. DUFOURMENTEL. (*Revue de Laryngologie*, October 1921.)

As the result of the examination of 30 cases of "œsophago-spasm" in Professor Sebileau's clinic the writer formulates the following conclusion:—

(1) The closure occurs at the œsophageal orifice in the diaphragm. This conclusion is supported by radiosopic findings and endoscopic examination. There is no cardiac sphincter of the œsophagus.

(2) The œsophageal opening in the diaphragm may be compared with the rectal opening in the pelvic diaphragm. Constrictions of these openings close up the abdominal cavity during straining effort.

(3) The musculature surrounding the diaphragmatic opening, like that surrounding the pelvic opening, is subject to spasm. The spasms are usually acute in onset and temporary only, but may become chronic.

(4) Spasm is usually due to irritation in the œsophagus, often of the sub-diaphragmatic portion. Irritation of the open cardia by hyperacidity of the gastric contents is suggested as a cause. Varicose veins at the lower end of the œsophagus may be another cause. These varicosities are analogous with those occurring in the neighbourhood of the perineal sphincter, *i.e.*, rectal hæmorrhoids.

G WILKINSON.

## REVIEW OF BOOK

*An Index of Treatment.* By VARIOUS WRITERS. Edited by Dr ROBERT HUTCHISON and Mr JAMES SHERREN. New Edition, revised and enlarged. (John Wright & Sons: Bristol, 1921.)

This well-known book of reference made its first appearance in 1907, and the fact that it has now reached its eighth edition goes far to prove its popularity. The whole work has been thoroughly revised so as to bring it abreast of the latest knowledge. A larger page and plainer type have been adopted. The writers of the various articles on diseases of the ear, nose, and throat, have succeeded in presenting to the practitioner a mass of practical information well suited to his daily needs.

Fifteen pages are devoted to affections of the ear, and all will agree that Mr A. H. Cheate has produced a useful section wherein may be found many a valuable hint regarding treatment.

The diseases of the nose and larynx, consisting of eighteen articles under various headings, are in the hands of Dr Lambert Lack, while Mr G. C. Cathcart is responsible for papers on the pharynx and tonsils. Breathing exercises are described under the treatment of adenoids.

A noteworthy contribution on Foreign Bodies in the Air Passages and Œsophagus and their treatment by modern endoscopic methods, is made by Mr E. B. Waggett.

Stammering, a subject on which few text-books give any information, has not been forgotten, and is treated in detail by Dr R. A. Worthington.

Mr Wilfred Trotter describes the treatment of Malignant Disease of the Mouth and Pharynx. Among other articles which concern the laryngologist are those on Headache by Dr Harry Campbell, on Diphtheria by Dr E. W. Goodall, on Radium Therapy by Dr Hayward Pinch, and on Transfusion by Mr A. Rendle Short.

Enough has been said to indicate the wide scope of the volume, which ought to be in the hands of every general practitioner. Should he be condemned to limit his library to one book, the *Index of Treatment* would meet all requirements.

DOUGLAS GUTHRIE.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W. 1.

*Section of Laryngology*—President, Sir William Milligan, M.D. *Hon. Secretaries*, Walter G. Howarth, F.R.C.S., and T. B. Layton, D.S.O., M.S. The next Meeting of the Section will be held on Friday, 30th June, at 4.45 P.M.

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BRITISH MEDICAL ASSOCIATION, GLASGOW.

The Ninetieth Annual Meeting of the British Medical Association will be held under the Presidency of Sir William Macewen, F.R.S., from the 25th to the 29th July inclusive. The Sectional Meetings are arranged for the 26th, 27th, and 28th. Laryngology and Otology have been placed in the Single Day Sections.

The following Office Bearers have been elected :—

*Section of Laryngology*—President, Dr John M'Intyre, Glasgow. *Vice-Presidents*, Dr A. Brown Kelly, Glasgow ; Sir St Clair Thomson, London. *Hon. Secretaries*, Dr Francis Frederick Muecke, 36 Cavendish Square, London, W. 1 ; Dr William Smith Syme, 11 Lynedoch Crescent, Glasgow.

*Section of Otology*—President, Dr A. A. Gray, Glasgow. *Vice-Presidents*, Dr J. G. Connal, Glasgow ; Dr W. F. Wilson, Newcastle-on-Tyne. *Hon. Secretaries*, Mr F. J. Cleminson, 32 Harley Street, London, W. 1 ; Mr J. W. Leitch, 6 Clairmont Gardens, Glasgow.

The Section of Otology will hold its Session on Wednesday 26th. Discussion : Septic Sinus Thrombosis, its Diagnosis and Treatment, introduced by Sir William Milligan and Mr Hunter Tod.

The Section of Laryngology will meet on Thursday 27th. Discussion : Diseases of the Oesophagus, their Symptomatology and Differential Diagnosis, introduced by Mr W. G. Howarth and Dr D. R. Paterson.

On Friday 28th, a Clinical Meeting of the Scottish Otological and Laryngological Society will be held in the Western Infirmary, to which all visitors are cordially invited.

With a view to facilitating the arrangements, social as well as scientific, Dr Syme will be glad if those who propose to attend the Meeting will intimate the fact as early as possible, stating, at the same time, if they propose to be accompanied by ladies.

FRENCH CONGRESS OF OTO-RHINO-LARYNGOLOGY.

The Congress will be held on the 17th July at the Faculty of Medicine of Paris under the Presidency of Dr Georges Laurens of Paris and the Vice-Presidency of Professor Jaques of Nancy.

# General Notes

The date of the Congress, usually held during the first fortnight of May, has been changed this year in response to the desire of many members who wished to see the Meeting coincide with that of the International Otolological Congress.

The subjects arranged for discussion are :—

I. The Classification of Chronic Deafness, introduced by Drs Escat and Rigaud.

II. Vaccine Therapy in Otolaryngology, Rhinology and Laryngology, introduced by Drs Baldenweck, Jacod and Moulonguet.

The detailed programme of Papers will be published later.

All communications should be addressed to Dr Georges Liebault, The General Secretary, 216 Boulevard Saint-Germain, Paris (VII).

## TENTH INTERNATIONAL OTOLOGICAL CONGRESS, PARIS, 19th to 22nd July 1922.

The Meetings will be held in the École de Médecine.

The following subjects for discussion (*Rapports*) have been arranged :—

I. Abscess of the Cerebellum.

II. Otitic Meningitis.

III. The Value of Functional Tests of the Vestibular Apparatus.

IV. Syphilis of the Ear.

The speakers will be :—MM. Buys, Gradenigo, Hennebert, Hinojar, Jenkins, Quix, and Schmiegelow.

During the Congress, a Supplementary Meeting will be devoted to the discussion of the following subject :—

### “The Treatment of Cancer of the Larynx by Operation and by X-rays and Radium.”

The speakers will be :—MM. Chevalier-Jackson, Moure, Regaud, St Clair Thomson, Sebileau, and Tapia.

The subjects for discussion will be printed and distributed before the Congress meets.

The mornings will be occupied in visiting the Departments for the treatment of Diseases of the Ear, Throat, and Nose, and for the surgery of the Head and Neck. (Operations, presentation of patients, etc.)

A collection of instruments and of anatomical and surgical specimens relating to diseases of the ear, nasal fossæ and nasopharynx, will be shown at the Faculty of Medicine during the Congress.

The subscription, which entitles members both to a copy of the *Rapports* and to the résumé of papers, is £2 sterling, and should be paid to the Treasurer, Dr George Laurens, 4 Avenue Hoche, Paris (VIII).

In order to facilitate arrangements, members are requested to state whether they intend to be accompanied by members of their family.

Tentative arrangements have been made at the Hôtel St James et d'Albany, 211 Rue St Honoré, for the accommodation of British Members of Congress.



## General Notes

Those who propose attending the Congress must make their own arrangements, both as regards their rooms at the hotel and their journey to and from Paris.

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The Congress of La Société Belge d'Otologie, de Rhinologie, et de Laryngologie will be held in Ghent in July 1922.

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### SECTION OF OTOTOLOGY, ROYAL SOCIETY OF MEDICINE.

On the invitation of Dr Macleod, Hon. Aural Surgeon, Leicester Royal Infirmary, the Section of Otology met at Leicester on Saturday, 29th April. The Session, which was informal in character, was much enjoyed by those members of the Section who were fortunate enough to be able to travel to Leicester on that day. Spring, which had tarried so long this year, seemed at last to have asserted herself, and the brilliant sunshine gave additional warmth to the welcome extended to the visitors by their hosts.

After partaking of the hospitality of Dr Macleod at luncheon in Wyvern Hotel, the members met at the Royal Infirmary, where a very interesting programme had been provided. A Demonstration of the Oral Method of teaching the Deaf-Mute was given by Miss Carter and by three ladies of her teaching staff. Three groups of pupils, each representing a different stage of pupilage, demonstrated to an interested audience how the deaf-mute acquired the power of speech and a progressive mental development, and they showed how successful the results might be in the hands of sympathetic and conscientious teachers. Miss Carter is Headmistress of the Deaf School in Leicester and works under the City Education Committee. This branch was inaugurated as far back as 1875.

In the Out-patient Department, Dr Macleod and Mr A. A. Keen, F.R.C.S., exhibited a number of children who had been under their care in the School Clinic on account of chronic middle ear discharge. The children were divided into four groups, the basis of grouping having been determined according to the method of treatment which had been adopted for the cure of the aural suppuration. The main interest was centred in the two groups in which Mr Keen had found it necessary to perform a mastoid operation on account of the failure in effecting the cure of the suppuration by attention to the nose and throat, and by daily antiseptic treatment through the external auditory meatus. In the first of the two groups a conservative mastoid operation had been performed; in the second, the complete operation had been found necessary. The results obtained in the first series of cases were good; in 50 per cent. the ear was dry, while the hearing power was very satisfactory in all. After the complete operation the cavities were dry with one exception, and in more than one child very useful hearing power was conserved.

The Discussion which followed was taken part in by Dr A. Logan Turner (the President), Dr A. R. Friel, Dr William Hill, Mr E. D. D. Davis, Sir William Milligan, Mr Mark Hovell, Mr A. R. Tweedie, Mr Musgrave Woodman, Mr W. M. Mollison, Dr Macleod, and Dr Keen. From the general trend of the remarks made by the speakers, it was evident that opinion was in favour of improving the preventive side of treatment. More should be done in the acute stage of aural suppuration to avoid

## General Notes

chronicity by such measures as early paracentesis and by a more prompt opening of the antrum ; by removing not only the adenoids but also the faucial tonsils ; and by bringing cases of suppuration under the supervision of an aurist in Child Welfare Centres and in the Fever Hospitals. A conservative mastoid operation, when the discharge had become chronic, was to be preferred to the complete operation, the latter procedure in children being regarded as one which should, if possible, be avoided.

Through the courtesy of Dr Warner, the School Medical Officer, the members were shown through the Leicester School Clinic ; the present building, which was opened in 1921, is well adapted for the purpose which it serves. A large number of school children suffering from eye, ear, throat, and skin affections are attended to annually in the Clinic, and many thousand complete case records are preserved. There is an operating theatre and a ward containing ten beds. All adenoid and tonsil operation cases are treated as in-patients for at least twenty-four hours. The mastoid cases remain in the ward until they have progressed sufficiently to be treated as out-patients. The financial position of the parents of the children coming under treatment is most carefully investigated. The very poor children receive free treatment. Those who are able to pay something are charged on a scale according to their means. As much as twenty-five shillings may be charged for an adenoid and tonsil operation. When the parents are deemed in a position to pay more than this sum, their children are not operated upon at the School Clinic. The system works well, and the Leicester Educational Committee is to be congratulated upon the efficiency of the Clinical Department, which has been in operation since 1913.

In addition to those members of the Section already mentioned, there also attended the Meeting, Sir Charles Ballance, Mr Lionel Colledge, Mr Powell (Reading), Mr Pavey-Smith (Harrogate), Mr Gilhespy (Birmingham), Mr Carter (Stoke-on-Trent), Mr Bennett (Leicester), Dr M'Call (Bournemouth), and the two Hon. Secretaries, Mr Norman Patterson and Mr F. J. Cleminson.

A. L. T.

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The Badge presented by Sir William Milligan for the use of future Presidents of the Section of Laryngology of the Royal Society of Medicine is in the form of a Star in white enamel and gold, surrounded by a circle in royal blue enamel and gold, with the motto : "*Sine amicitia vitam esse nullam.*" In the centre of the Star is a replica of Signor Manuel Garcia taken from a photograph in 1857, at the time his epoch-making paper upon the discovery of the Laryngoscope was read to the Royal Society. The presentation was made at the Annual Dinner of the Section held on May 5th.

# The Journal of Laryngology and Otology

*(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)*

## EDITORIAL

### THE POSITION OF LARYNGOLOGY AND OTOLOGY IN THE MEDICAL CURRICULUM IN GREAT BRITAIN.

THE senior members practising in the Specialty to-day, whether graduates of a University or members and licentiates of one of the Medical Corporations, when looking back upon their student days will recall the fact that neither their Alma Mater nor the Qualifying Body whose diploma they sought, required from them any evidence of their having attended instruction in laryngology and otology. The teaching of ear and throat disease occupied no place in the medical curriculum during the period of their pupilage, and though special hospitals and dispensaries existed for the treatment of such cases, the large general hospitals, in which medicine and surgery were taught, had no special departments in the charge of laryngologists. Patients seeking advice on account of ear and throat ailments were placed in the hands of one of the assistant surgeons of the hospital.

Others, again, holding a less senior position, will remember that while special departments for the treatment of ear and throat disease had come into existence in the Hospital Schools, and the staff were prepared to give tuition, they were not recognised as teachers by the Qualifying Bodies, and no facilities were provided in the curriculum for the attendance of the student at a course of instruction.

A younger group of specialists will recall that laryngology and otology were included in certain optional courses in the curriculum, one of which the student was obliged to show

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evidence to his Examining Board that he had attended, before he could qualify as a practitioner of medicine. Lectureships too were being founded. The subjects had begun to receive some recognition from certain of the Qualifying Bodies.

Finally, a period is reached which embraces the most junior members practising the specialty, when compulsory instruction and an examination test in laryngology and otology were introduced into the curriculum in some of the Universities, while in others it remained as a voluntary subject of study.

It would prove somewhat laborious to assign to each of these four periods its exact chronological place in the curriculum of the various Medical Schools in the country. The absence of uniformity in the medical curricula organised in the different Universities and Medical Corporations, and the earlier recognition of the subjects in some Schools than in others, have produced a degree of overlapping of the periods which renders disentanglement somewhat difficult. It is obvious, however, from what has been said, that a progressive, if slow, realisation of the necessity of recognising instruction in an important branch of medicine and surgery, had become apparent to those who directed and arranged the training of the medical student. The periods under consideration cover forty years or more, and may be subdivided roughly into four decades. A short synopsis of the actual development of events in one of the Scottish Schools of Medicine (University of Edinburgh) may be given as a concrete illustration of the progressive steps sketched in the opening paragraphs, and it will indicate the milestones which marked the growing importance attached to laryngology and otology, not only as a specialised branch of medicine, but as a subject deemed worthy of study by the medical student.

In the decade prior to the year 1883, the period when the senior members in the specialty were students of medicine, the Royal Infirmary, Edinburgh, made no provision for the treatment of cases of ear and throat disease: the patients who presented themselves received treatment at the hands of the general surgeons. Special clinics were conducted at one or two of the dispensaries in the city, but no encouragement was given by the University to the undergraduate to avail himself of the facilities which these institutions offered.

In 1883,\* the Managers of the Royal Infirmary considered

\* In 1882, Sir Felix Semon had been appointed Physician for Diseases of the Throat at St Thomas's Hospital, London.

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that it was expedient in the interests of the public as well as of the hospital that an out-patient clinic for diseases of the ear and throat should be established, and in March of that year Dr P. McBride, who, four years earlier, had become a lecturer in oto-laryngology under the auspices of the two Royal Colleges in Edinburgh, was put in charge of the department. It was not until 1891, however, that special beds were provided for the indoor treatment of ear and throat disease, six being allotted for this purpose.

In the academic year, 1896-97, two optional subjects were placed in the medical curriculum of the University, the Diseases of Children and the Diseases of the Ear and Throat, and the student was required to show evidence that he had attended at least one of these two special courses. The regulations provided that in oto-laryngology there should be six class-room meetings and twelve clinical demonstrations. In 1897, a University Lectureship in Diseases of the Larynx, Ear, and Nose was instituted. In 1911, a course in Dermatology was added to the above subjects and the student had now to attend two of three optional courses.

It was not until 1913 that the fourth decade in the evolution of instruction in laryngology was reached. The subject ceased to be an optional one and became compulsory. An examination test was introduced, patients being sent from the Ear and Throat Department to the examiners in Clinical Surgery at the Final Professional, every fourth candidate receiving a special case in addition to the ordinary surgical cases that were provided. As this method of examination did not prove satisfactory, the Faculty of Medicine, in October 1914, resolved to accept the certificate of the special teachers as sufficient evidence of the student's knowledge; but the examiners in Clinical Surgery at the Final Professional might continue to examine candidates, at their discretion, upon cases in their own wards coming within the special branch. No fixed percentage in the class examination was insisted upon, but the teacher's certificate was accepted as evidence of regular attendance, of general interest in the work of the class, and of a reasonable standard in the class examination. If the student failed in the matter of attendances, he required to take out the class again, but if his percentage in the class examination was not deemed satisfactory, he had to appear for the examination in a following term without re-attendance at the class.

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After a second failure, he was obliged to rejoin the class. These tentative proposals remained in operation until 1921, when one change was introduced; the certificate of attendance was to be withheld unless a standard of 50 per cent. was obtained in the class examination. Regular attendance and the necessary percentage became interdependent, and their due attainment qualified the student to sit for his Final Professional examination.

Laryngology and Otology have thus become an integral part of the student's training in medicine, and his knowledge is not only acquired at the hands of specialists, but it is tested by them in the form of an examination. During the last twelve months, the importance of the study of the special subjects has been brought more prominently to the notice of the student in Edinburgh from the fact that he is obliged to devote all the hospital hours of one term of his fourth year to their study. Diseases of the Eye, of the Ear and Throat, and Diseases of the Skin occupy the ten weeks of one term to the exclusion of other branches of medicine and surgery. The concentration of the attention upon these particular classes during one session, terminating in a written and practical examination which demands 50 per cent. of the marks, cannot fail to produce the impression in the student's mind that the subjects deserve more than a cursory study.

Having thus sketched the gradual development of instruction in laryngology and otology in one of the Medical Schools in Great Britain, it remains to record the regulations which are at present in force in the other Universities and in the Medical Corporations. This has been made possible through the courtesy of the Deans of the Medical Faculties and the Secretaries of the Royal Colleges and of certain of the Hospital Medical Schools, to whom the writer desires to express his indebtedness.

*The Scottish Universities.*—The regulations in the four Scottish Universities may be considered first. Though not identical, they have a degree of uniformity which permits of their consideration as one group. In all, attendance is compulsory during the fourth or fifth year of study, while the instruction is both systematic and clinical. In three of the Universities, St Andrews, Edinburgh, and Aberdeen, laryngology and otology are taught as one subject, but the time

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which is allotted during one term of the academic year varies somewhat in the different Schools. Thus, in St Andrews, 44 hours are devoted to the subject, 20 being given to lectures and twelve meetings of two hours each to clinical work; in Edinburgh, 30 hours are set aside for this purpose, 10 to systematic teaching and 20 to clinical instruction; in Aberdeen, there are 20 hours in all, equally divided between the classroom and the clinic.

In Glasgow University laryngology and otology are taught separately, each branch being in the hands of a special lecturer. Consequently, the student is required to devote a portion of two terms to the subjects, attending twelve lectures and twelve clinical meetings on nose and throat disease in one term, and a similar period of instruction in diseases of the ear during a second term. He devotes, therefore, forty-eight hours to the study of the specialty.

Although attendance in the Ear and Throat Department forms a compulsory part of the student's training at the four Scottish Universities, the examination test is not yet obligatory in each School. The system adopted in Edinburgh has already been explained; in St Andrews and Aberdeen the class examination is also compulsory, but, while in the former 40 per cent. of the available marks is required, in the latter the teachers' certificates are accepted by the Medical Faculty as evidence that the work has been satisfactorily performed. In Glasgow, the examination is still voluntary, only those students who are desirous of competing for class honours taking part in it. From time to time the examiners in Systematic Surgery at the Final Professional examination may set questions relating to these special regions, a procedure, however, which is carried out by all the Examining Bodies in the country.

*The English Universities.*—It will simplify matters if the Universities in England are dealt with in groups. The University of London, which is an examining and not a teaching institution, requires from the candidates for her M.B., B.S. examination a certificate that they have attended instruction in laryngology and otology: although this is compulsory, no examination test is demanded. The opportunities of obtaining the instruction which is given to the candidates, depend upon the facilities offered by the Hospital Medical School at which they are studying.

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Of the ancient Universities, Oxford, Cambridge, and Durham, the last-named alone requires evidence of compulsory attendance. In the University of Durham College of Medicine, the instruction is provided during the fifth year of study in the form of ten lectures and twenty hours of clinical work. A class examination at the end of the term is obligatory, but, in addition to this test, the student is examined at the Final Professional by a general surgeon upon cases sent up from the Ear and Throat Department. When the new regulations come into force, it is proposed that this part of the examination should be conducted by a specialist in the subject.

In the six modern Provincial Universities of England instruction in laryngology and otology is compulsory in three, namely, in Leeds, Sheffield, and Bristol. Provided for during one term in the fourth or fifth year of medical study, the method of conducting the course varies somewhat in the three schools. In Leeds, fifteen hours are devoted to lectures and fifteen to clinical instruction; a three months' clerkship in the department is also open to students. There is no class examination test. In a small School the individual has more opportunity of clinical study, and the lecturer is better able to assess the value of the work done than in the larger Schools. In Sheffield, there is a three months' course in which systematic and clinical instruction are combined, and the student is required to sit at a class examination. In Bristol, ten lectures are delivered and eighteen clinical meetings are provided, but although the course is compulsory, there is no knowledge test exacted either in the form of a class examination or as a part of the Final Professional.

In the Universities of Birmingham, Manchester, and Liverpool, on the other hand, attendance at a course on diseases of the ear and throat is still voluntary. Ample opportunities, however, are provided by the teaching staffs for giving instruction to those who desire it. In Birmingham, there is a clinical demonstration on one day each week during the session. In Manchester, the University Lecturer in Laryngology and Otology gives twenty lectures, and he teaches in his clinic three days each week during the term, while in Liverpool there are six lectures and opportunities for clinical study. There are no class examinations, but in every case questions are set by the general surgeon in the Final Professional examination.



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*The University College of South Wales.*—A compulsory course is required during one term in the fourth year of study. The course consists of thirteen lectures and twenty-six clinical meetings. At the class examination 40 per cent. of the marks must be obtained, but, in addition, the subjects form part of the Final Professional, the examiners in both instances being the specialists in the subject.

*Ireland.*—As regards the procedure in Ireland, our information is confined to the methods adopted at Trinity College, Dublin, and at the Queen's University, Belfast. At the former, attendance is purely voluntary ; no formal course of instruction in laryngology and otology is provided, but during the fifth year of study, students are encouraged to attend the work in the Ear and Throat Department. In the Queen's University, Belfast, compulsory attendance is demanded at a combined course of otology and ophthalmology during the fourth year ; twenty-six meetings are devoted to a study of the two subjects, and in the Final Professional examination selected cases are placed before the candidate.

*The Medical Corporations.*—The English Conjoint Board, under the present regulations, does not require an attendance certificate in laryngology and otology. Instruction upon a voluntary basis is included in general hospital practice, and the means of obtaining it are provided by the staff of specialists at the various hospitals attended by the candidates seeking the M.R.C.S., L.R.C.P. Diploma. The Scottish Triple Qualification Board is in a somewhat similar position. Students are recommended to pay particular attention to practical work and to avail themselves of opportunities of acquiring clinical knowledge of diseases of the ear and throat, but they are not required to show proof of having sat at a class examination. At the Apothecaries' Society of London, no certificate of attendance is necessary for the L.S.A. Diploma.

In order to fill up an obvious gap, it is necessary to indicate the facilities for instruction which are offered to students undergoing their clinical training at the London Hospital Schools for the Bachelor's Degree of the Universities of London, Oxford and Cambridge, and for the Diploma of the English Conjoint Board. For this purpose inquiries have been made at some of the London Hospitals. Thus, at St Bartholomew's, clinical instruction is given by the staff of the Ear and Throat Departments, and periodical lectures are delivered. Clerkships may

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be obtained for a period of three months. At Guy's Hospital, voluntary clinical appointments are provided during a term of twelve weeks in the fifth year of study, while eight lectures are delivered during the fourth and fifth years of the student's curriculum. At King's College Hospital, daily instruction may be obtained in the Clinical Department, and one lecture is delivered each week over a period of three months. At the London Hospital, the course occupies one term during the fifth year of study, and consists of thirty meetings, ten systematic and twenty clinical. At St Thomas's, provision is made for ninety-six hours of clinical work, eight hours being set apart each week during a term of twelve weeks. In addition, nine lectures are delivered once a year, while the surgeons in charge of the departments give, in rotation, occasional clinical lectures.

*Status of the Teachers.*—Instruction is given by members of the staff of the special departments attached to the large teaching hospitals connected with the different Schools of Medicine, or in such hospitals specially devoted to the treatment of diseases of the ear and throat as may be recognised by the Qualifying Bodies as providing sufficient clinical material for purposes of tuition. The majority of the Universities in the country have now instituted special lectureships in laryngology and otology, the appointments being held by one or more of the specialists attached to the teaching hospitals. In two of the Schools the teacher has attained professorial status: in King's College Hospital Medical School there is a Professor of Laryngology, and in Trinity College, Dublin, an Honorary Professor of Laryngology and Otology.

Having sketched the gradual development and the present position of laryngology and otology in the medical curriculum, it will not be out of place to say a few words as to the principles which should guide the teacher in the exposition of the subject. Opinions may differ as to what should constitute the essentials which ought to be placed before the student, but general agreement will probably be found with the statement that, as we are instructing the future practitioner of medicine and not the young specialist, a correct perspective ought to be maintained and no attempt should be made to deal with the subject in the detailed and more elaborate manner necessary in post-graduate courses.

As the student may be inclined to regard the class merely in the light of another special subject added to an already very

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full curriculum, it is advisable to correct this mental attitude, and, at the outset, to create the impression that the course provides him with an opportunity of looking at medicine and surgery from a somewhat different angle than that from which he has previously studied those subjects. It will stimulate his interest to learn that his diagnostic equipment for the detection of systemic disease will be strengthened by familiarity in the use of the aural and nasal specula, and that even a slight acquaintance with the method of handling the laryngeal mirror will prove of considerable value to him. He should be brought into personal contact, therefore, with patients in strictly limited clinical classes, and he should himself examine the cases and learn to recognise the commoner affections of the upper respiratory and alimentary tracts. If, at the same time, due emphasis is laid upon the importance of certain clinical symptoms and signs, not only in their connection with the local disease in the ear, nose, and throat, but in their bearing upon, and in their possible relation to, the causation of certain general diseases, then the "watertight" character of the instruction will, to a large extent, disappear and the student will appreciate the fact that, in some measure, he is enlarging his outlook upon medicine.

When vertigo is brought before his notice not only as one of the cardinal symptoms of ear disease, but as an indication which may presage the onset of arterio-sclerosis, or be dependent upon a general toxæmia, while the same symptom, with or without associated deafness, may indicate the development of an intracranial tumour or some other organic affection of the central nervous system, then his mental horizon will not be bounded by the temporal bone. He will recognise that the functional examination of the auditory and the vestibular apparatus, which has been carefully demonstrated to him, is not merely a somewhat elaborate method of investigating an affection of the ear itself, but, in its wider application to medicine, it has been placed in his hands as an important part of his equipment as a physician. The suppurating ear as a cause of pyogenic intracranial infection, or as a not infrequent etiological factor in the production of septicæmia or pyæmia, is impressed upon him, so that, in the future, he is alive to the possible existence of an unsuspected or unacknowledged chronic otorrhœa. He does not, therefore, unduly delay to the detriment of his patient, in seeking to establish a diagnosis

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of enteric, of malaria, or of an aberrant case of influenza, knowing that an examination of the ear may remove the difficulty in diagnosis.

He will cease to regard epistaxis as only a troublesome nasal condition with which he may require to deal promptly, because it will appeal to him as a possible warning of renal mischief or of high arterial tension, demanding, on his part, a more extended examination of the patient. He realises that chronic nasal or accessory sinus suppuration, though often an isolated clinical entity, may sometimes play a part in the production of one of those obscure toxic conditions, the causation of which frequently baffles him. The rôle of the lymphoid tissue in the nasopharynx in retarding the mental and physical development of the child and in disseminating the virus of tubercle or other systemic infections, gives a wider and more general interest to the study of adenoids and tonsils beyond the local question involved in the hypertrophy of the lymphatic tissue in these areas.

Hoarseness ceases to be looked upon as merely a vocal expression of a simple catarrh of the larynx to be lightly dismissed without laryngoscopic examination. He recognises in the changed condition of the voice one of the most valuable diagnostic symptoms with which he has hitherto been brought into contact. The part played by the recurrent laryngeal nerves in the causation of hoarseness throws a flood of light upon the clinical significance of an anatomical area previously shrouded in darkness. In the altered voice due to vocal cord paralysis, he realises the possibility of a danger signal which leads him to look beyond the larynx and to conduct an investigation which may disclose the existence of an aneurism, a mediastinal tumour, pulmonary tubercle, œsophageal cancer or a central nervous affection. Further, he has learnt to regard hoarseness as usually the first, and often, for a long period, the only symptom of malignant disease within the larynx, which demands the immediate employment of the laryngeal mirror, as in no part of the body is the prognosis more favourable if the diagnosis is made sufficiently early.

Viewed in this light, a course of instruction on diseases of the ear and throat justifies its place in the medical curriculum, and the student, provided with the knowledge which he has obtained, has undoubtedly added to the sum of his usefulness as a practitioner of medicine. The majority of teachers will

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agree that a judicious combination of systematic and clinical instruction is advisable, as in this way alone the subject can be satisfactorily taught.

At the present time, a rearrangement of the medical curriculum is under consideration by the General Medical Council, and there is little doubt that, when in the near future the new regulations come into force, laryngology and otology will be found to occupy the position to which their undoubted importance entitles them. Compulsory instruction will be demanded by all the Universities and Qualifying Bodies preliminary to qualification, and a suitable test of the student's knowledge will be introduced into the scheme. Whether the latter will take the form of a carefully kept Term record or a class examination, or become an integral part of the Final Professional, or whether a combination of two or all of these methods be instituted, the test will be supervised by the specialists engaged in teaching the subjects.

The same system of instruction and examination ought not to be enforced in all the Schools, but it should be left to each of the Qualifying Bodies to adopt that form which is best suited to the individual circumstances. Progress is not obtained by insisting on uniformity and stereotyped methods, but by permitting variation, and each School should preserve its liberty to advance and improve its own scheme of education.

A. LOGAN TURNER.

## OTO-LARYNGOLOGY IN FRANCE.

By SIR ST CLAIR THOMSON, Chevalier de la Légion d'Honneur.

THE speciality of diseases of the throat and ear in France, much as in our own country, has arrived by a slow process of struggle and evolution. Like Topsy in *Uncle Tom's Cabin*, oto-laryngology was never born—"it grewed." Otology, as the older of the two sciences, can trace its beginning back to the dawn of medicine; while laryngology, although it has interesting pre-laryngoscopic records, may be considered as dating, for all practical purposes, from the invention of Garcia in 1854. In the middle of last century Paris possessed only one service of oto-laryngology, viz., that of Dr Isambert at the Hôpital Lariboisière. But even he, by a curious perversion, was not recognised as a laryngologist; he was a "médecin des hôpitaux," in other words, a general physician, who was allowed to fill his beds with cases of throat and ear disease. He was succeeded by another general physician, Dr Gouguenheim, with whom I studied in 1893, when his service was devoted entirely to diseases of the nose and throat. About the same time, Duplay, although Professor of Clinical Surgery, gave instruction in otology at the Hôtel Dieu.

One of Gouguenheim's *internes* was Dr Lermoyez, who, having gained by competition the coveted post of Médecin des Hôpitaux, turned his service of general medicine into one of otology and laryngology on his appointment to the Hôpital St Antoine. On Gouguenheim's death his service was taken over, in 1900, by Dr Sebileau. Sebileau commenced his medical career as an anatomist and surgeon. Since 1900, he has devoted himself chiefly to the surgery of the head and neck, and, in his official capacity as Professor of Oto-rhino-laryngology in the Faculty of Medicine, he is President of the forthcoming International Congress of Otology in Paris, on the 19th of the present month.

It is interesting to recall that Gouguenheim was never recognised as a teacher of our speciality, nor was Lermoyez, although the latter is one of the leaders in the subject and his service at St Antoine has for long been the best known in Paris. But the action of these two "Médecins des Hôpitaux," in filling their beds with throat and ear cases, no doubt aroused the "Assistance Publique." Readers may be reminded that

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the hospitals of Paris, as elsewhere in France, are not charitable institutions, self-governing, and kept up by a philanthropic public. They are under the municipality and controlled by a department of it which is called the "Assistance Publique." This bureaucratic body was also stirred into action by the enterprise of private practitioners. Men of energy and vision—just as in London—who saw no chance of these young specialities receiving recognition from the University, started their own private clinics, analogous to our early special hospitals.

It was from these private clinics—often from very modest surroundings—that original work and numerous pupils went forth from the hands of Gellé, Miot, Fauvel, Lubet-Barbon, Luc and others in Paris, Garel and Lannois in Lyons, Moure in Bordeaux, and others in smaller provincial cities.

About 1895, the Assistance Publique bestirred itself by allowing certain distinguished specialists to take charge of special wards and give occasional courses. But it was only in 1902 that the Assistance Publique of Paris established, as a new order, the "Oto-rhino-laryngologistes des Hôpitaux." Dr Lombard, a pupil of Lermoyez, was the first to win one of the new posts by competitive examination. We had to deplore his death last year.

Subsequent gainers of this distinction have been as follows:—In 1904, Bourgeois; in 1910, Lemaître; in 1911, Grivot; in 1914, Hautant and Baldenweck; and in 1920, Le Mée and Moulonguet. We notice that a competition for two more "Oto-rhino-laryngologistes des Hôpitaux" was held in Paris last April.

The next step was made when a specialist was "charged with a course," as Castex was in Paris. Some of the provincial universities started with nominating a specialist as "chargé d'un Cours"; later on they were called Associate Professors; and finally, they were given Chairs of Oto-Rhino-Laryngology.

The first to win his way to this high recognition was Moure, who has been Professor in Bordeaux since 1913.

Paris followed suit by making Sebileau a Professor in 1919; since 1920, Lannois has been elected at Lyons, Mouret at Montpellier, and Jacques at Nancy. Escat has been nominated "Chargé d'un Cours" at Toulouse; Canuyt has received the same distinction in the Faculty of Medicine at Strasburg, and, since 1910, Texier has had the same post in the School of Medicine at Nantes. In addition, Dr Bremond occupies the Chair in the School of Medicine at Nantes.

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Returning to Paris, there are, at the present time, four complete recognised "Services," *i.e.*, a director with his staff of assistants, his beds, and his out-patients. They are:— (1) Professor Sebileau at the Lariboisière Hospital, (2) Lermoyez at the St Antoine, (3) Bourgeois at the Lænnec, and (4) Lemaître at the St Louis. In addition there are what we should call the "out-patient clinics" of (*a*) Grivot at La Pitié, (*b*) Hautant at the Bretonneau, (*c*) Baldenweck at the Beaujour, (*d*) Le Mée at Les Enfants Malades, and (*e*) Moulonguet at the Trousseau.

At most of the hospitals the *mise-en-scène* is much more commodious than we are used to in this country. Lermoyez's service is well known to visitors at the Hôpital St Antoine, where they have always been received with delightful courtesy and where they have seen him training distinguished pupils like Georges Laurens, Lombard, Bourgeois, Hautant and others. Hautant is still working at the St Antoine. The department at the St Louis Hospital is being entirely reconstructed, and, if ready in July, will afford visitors the opportunity of seeing one of the most complete installations with laboratory, X-rays, etc.

In addition to these holders of official positions there have been many distinguished specialists who carried out their researches and their teaching in private clinics. Amongst these Lubet-Barbon has long held a distinguished position. His writings on the ear are well known in Britain. The clinic, the work, and the personality of Luc have long been famous. His well-known book, *Leçons sur les suppurations de l'oreille moyenne et des cavités accessoires des fosses nasales et leurs complications intracrâniennes*, laid the basis of the knowledge of many of us in both hemispheres. It is to the sincere regret of all his friends, and particularly of his numerous English ones, that his health has lately compelled him to withdraw from much of his work. His clinic is in the capable hands of Dr Guisez. Dr Georges Laurens, with only the resources of the private Hospital of St Joseph (where he succeeded Dr Chatellier), has not only given regular courses of instruction but has produced two magnificent volumes on *The Surgery of the Throat and Ear*, which we know in its English translation by Dr Clayton Fox. In the same way Dr Castex is known for his successful text-book. Boulay and Le Marc Hadour are also known for the work done in their private clinics.



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Visitors to medical Paris need never feel at a loss as there exists a special body for giving foreign students every help and information they may be seeking. This has the rather cumbersome title of "Association pour le Développement des Relations Médicales avec les Pays Alliés et Amis." Fortunately, by selecting the initials of part of it, this body is briefly known as the "A.D.R.M." It is located in the Faculté de Médecine (where the Congress will be held), and if any visitor asks for the "Salle Beclard" he will find a polite secretary ready to give him every information on all the hospitals and all departments.

This sketch will, I hope, demonstrate to visitors to the forthcoming International Congress of Otology, that our special department in France has at last come into its own. With this brilliant record of individual work behind it, we may look forward to a still richer production now that it has received full official recognition. The admiration that we have for the French School and the gratitude which we owe to such pioneers as Lubet-Barbon, Moure, Luc, Lermoyez, Mouret, Garel, Georges Laurens and others, is, I might add, thoroughly reciprocated by our colleagues, who have often expressed their admiration for the work of Toynbee, Wild, and Morell Mackenzie—to mention only those of our school who are past and gone. I feel sure that visitors to Paris in July will find an abundance of interest and instruction, and will receive the most courteous, graceful, and warmest of welcomes.

For much information in this article I am indebted to my friends, Drs F. Lemaitre and C. Jarvis of Paris.

## FRENCH JOURNALS OF OTO-LARYNGOLOGY.

In France there are five periodicals devoted to our special work. They are as follows:—

1. *Les Annales des Maladies de l'Oréille, etc.* Edited by Messrs Lannois, Lermoyez, Sebileau, Jacques, Georges Laurens, Mouret, Escat, and Hautant.
2. *Les Archives de Laryngologie.* Edited by Drs Lemaitre and Baldenweck.
3. *Le Bulletin d'Oto-Rhino-Laryngologie.* Edited by Drs Guisez and Paul Laurens.
4. *La Revue de Laryngologie.* Edited by Prof. Moure of Bordeaux.
5. *L'Oto-Rhino-Laryngologie Internationale.* Edited by Dr Chavanne of Lyons.

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## THROAT AND EAR HOSPITALS.

The following is a list of the leading services and clinics in Paris, with both the hospital and private address of their chiefs. Most of the clinics are open every morning, except Saturday and Sunday, from 9 A.M. till mid-day. The hours of consultation for private practice are generally in the afternoon, from 2 to 4 P.M.

### A.—FACULTÉ DE MÉDECINE DE PARIS.

	HOSPITAL.*	PRIVATE ADDRESS.†
Prof. Sebileau . .	Hôpital Lariboisière, 2 Rue Ambroise Paré.	56 Rue de la Boétie. Tel.: Elysées, 11 61.

### B.—HÔPITAUX DE L'ASSISTANCE PUBLIQUE SERVICES.

Dr Lermoyez . .	Hôpital St Antoine, 184 Faubourg St Antoine.	20bis Rue de la Boétie. Tel.: Wagram, 17-04.
Dr Bourgeois . .	Hôpital Laënnec, 42 Rue de Sèvres.	44 Rue de Naples. Tel.: Wagram, 57-27.
Dr Lemaître . .	Hôpital St Louis, 40 Rue Bichat.	120 Avenue Victor Hugo. Tel.: Passy, 41-62.

### C.—OUT-PATIENT CLINICS.

Dr Grivot . .	Hôpital de la Pitié, 83 Boulevard de l'Hôpital.	6 Square du Roule. Tel.: Wagram, 71-22.
Dr Hautant . .	Hôpital Bretonneau (enfants), 2 Rue Carpeaux.	28 Rue Marbeuf. Tel.: Passy, 34-33.
Dr Baldenweck .	Hôpital Beaujon, 208 Faubourg St Honoré.	83bis Rue de Courcelles. Tel.: Wagram, 21-40.
Dr Le Mée . .	Hôpital des Enfants Malades (enfants), 149 R. de Sèvres.	120 Boulevard St Germain. Tel.: Fleurus, 09-78.
Dr Moulonguet .	Hôpital Trousseau (enfants), 158 Avenue du Général Michel-Bizot.	6 Rue Marbeuf. Tel.: Passy, 74-72.

### D.—PRIVATE CLINICS.

Dr Lubet-Barbon .	Clinique des Grands Augustins, 19 Rue des Grands Augustins.	4 Rue Georges Berger. Tel.: Wagram, 74-82.
Dr Georges Laurens.	Hôpital St Joseph de Rue Pierre Larousse.	4 Avenue Hoche. Tel.: Elysées, 06-61.
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# THE SO-CALLED PROLAPSE OF THE LARYNGEAL VENTRICLE, AND EVERSION OF THE SACCULUS.

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(Continued from p. 274.)

## DISPLACEMENT OF THE MUCOUS MEMBRANE OF THE LARYNGEAL VENTRICLE—THE SO-CALLED PROLAPSE.

GROUP I.—Prolapse-like “Tumours,” or protruding folds of mucous membrane arising from relaxation of the mucosa.

The Eversion may be due to:—

- (a) Mechanical or non-inflammatory causes, *e.g.*, traumatism, voice strain.
- (b) Acute inflammatory œdema or hyperplasia, *e.g.*, acute catarrh.
- (c) Chronic hyperplasia, *e.g.*, chronic catarrh, tuberculosis, syphilis.

GROUP II.—Eversion due to the traction of cysts and tumours.

- (a) Retention cysts, *e.g.*, Koschier's<sup>9</sup> cases, etc. (see p. 345).
- (b) Neoplasms, *e.g.*, Koschier's<sup>9</sup> case of Myxofibroma (see p. 346); Moure's case of Angeio-myxoma, described by Noack<sup>32</sup> (see p. 347); Garel's<sup>11</sup> case of Fibro-lipoma (see p. 347); Chappell's<sup>33</sup> case of Carcinoma (see p. 346).

## ABSTRACTS OF CASES RECORDED IN THEIR CHRONOLOGICAL ORDER.

GROUP I.—*Prolapse-like “Tumours,” or protruding folds of mucous membrane arising from relaxation of the mucosa.*

Lefferts<sup>2</sup> (New York), in 1876, under the title of “Prolapse of Both Ventricles of the Larynx,” recorded the first case in which this condition was studied during life, and in which an operation was undertaken for “removal of the ventricles.” Patient was a male, who two years previously, on awakening, found that he was completely aphonic. He had long suffered from chronic catarrh of the pharyngo-laryngeal tract, accompanied by occasional hoarseness, and of late the breathing had become stridulous. There was no specific or tubercular history. An ovoid tumour with a tense, red, and shining mucous membrane occupied the entire left ventricular orifice. Its anterior extremity was tapering, whilst its posterior was rounded, and

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its upper surface flattened. The left vocal cord could not be seen. No change was observed on deep respiration or phonation. On the right side a thin pale fold of mucous membrane lay upon the vocal cord touching the other tumour (Fig. 10). Its origin appeared to be immediately below the ventricular band, and its mucous membrane showed chronic catarrhal inflammation with some oedema. On partial phonation the tumour was seen to roll backwards upon itself, and on complete phonation and tension of the vocal cords it entirely disappeared within the ventricle. As soon as the cord was relaxed the tumour re-appeared again in its former position. In view of the stridor Lefferts performed thyro-fissure, excised the tumours and cured the patient. He did not think that they could have been removed by the indirect method without risk of tearing the adjacent mucous membrane and giving rise to inflammatory reaction. He stated that the tumours proved to be the "everted ventricle." (There is no proof that this is the case.) Lefferts observed on the anterior extremity of the left tumour a small linear elevation terminating in a small protrusion which he says undoubtedly represented the location of the sacculus laryngis. Microscopical examination of the excised tumours showed that they were protrusions of the laryngeal ventricle, the left being enormously hypertrophied—the primary cause being an inflammatory swelling and thickening of the sub-mucous connective tissue, which, pushing the mucous membrane before it, protruded it through the ventricular orifice. Moller (Copenhagen), in referring to this case, came to the conclusion from the description that it was one of inflammatory hyperplasia.

Waldenburg<sup>34</sup> (Berlin), in 1881, referred to a male of military age (age not stated), who was under observation for a long time with "prolapse of the ventricle." A colleague diagnosed the tumour as a polypus, which it resembled. Frequent palpation with a probe caused the mucous membrane to retract inside the ventricle of Morgagni. Marked retraction occurred following the application of astringents with almost complete disappearance of hoarseness. No further details are given. (This apparently is another case of inflammatory oedema.)

Elsberg<sup>35</sup> (New York), in 1882, reported the case of a male, aged 39, with a history of liability to chronic catarrh of the mucous membranes, and a harsh voice since infancy. Some inspiratory stridor was present. On examination, two tumours, the left larger than the right, were seen lying upon the vocal cords, apparently covering all but a small portion of the cords anteriorly and posteriorly, and issuing from the ventricles (Fig. 11). They were larger during respiration than during attempted phonation. *The edges of the ventricular bands were quite indistinct during respiration*, but were sharply defined during phonatory effort. The tumours were pear-shaped, with the

## Prolapse of Laryngeal Ventricle

small end in front, soft and easily indented with a probe, and could be pushed back into the ventricle to remain for a few minutes to an hour, or to appear at once on coughing. On phonation, a compression of the two tumours against each other, with their actual sliding inside the ventricle, could be observed. From these features a diagnosis was made of "Eversion and Prolapse of the Sacculus Laryngis," and it was regarded as congenital. The left tumour was removed in two pieces by cutting forceps, and "confirmed the nature of the case." The "sacculus" of the right side was replaced as far as possible daily for three months, and Iodide of Zinc and Persulphate of Iron applied, following which, a month later, there was no trace of the tumour on the left side, and only a small elevation on the floor of the right ventricle, and the voice was clearer than before. For some years the patient reported that his voice never failed him. [Of this case Shattock observes that the elongation of the eminences shows that they do not represent the everted sacculi; and had they included the sacculi, their anterior parts would have been prolonged inwards beyond the rest.]

Solis-Cohen<sup>36</sup> (New York), in 1882, recorded the case of a doctor (age not stated), suffering from aphonia with inspiratory stridor, which commenced suddenly during an attack of bronchitis six months previously and followed a severe attack of coughing. On examination a tumour was seen protruding from the right ventricle and nearly covering the entire vocal cord (Fig. 12). It was diagnosed as a "prolapse of the laryngeal sac" (sacculus laryngis) because of the *lack of a line of demarcation* between the ventricular band and the ventricle, and also because it could, in part, be temporarily replaced by means of a bent probe. Two months' treatment with copper sulphate reduced the anterior half of the swelling, leaving only some hoarseness of the voice. A year later the voice had much improved, though the condition of the swelling had not changed. Nolan Mackenzie<sup>17</sup> referred to this case as an "Eversion of the Ventricle." Chiari<sup>39</sup> suggested hypertrophy of a fold of mucous membrane proceeding from the wall of the ventricle and protruding into the larynx. [Shattock thinks that the drawing published by Solis-Cohen with his case suggests an inflammatory hyperplasia involving the ventricular band and parts immediately underneath, because the edge of the false cord merges into the swelling, and the form of the swelling is too elongated to represent an everted sacculus, judging from the proved specimens of Moxon and Morell Mackenzie. Again, if the protrusion represented the everted sacculus with a secondary eversion of the ventricle it should take the characteristic form, *i.e.*, the anterior portion representing the everted sacculus should project much more considerably into the air-way.]

Nolan Mackenzie<sup>17</sup> (Baltimore), in 1882, recorded two cases of

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"Prolapse of the Ventricle" seen by him whilst working under Morell Mackenzie at Golden Square Hospital. The first, a male, aged 28, who had for long suffered from repeated catarrh of the respiratory tract, and two years previously had contracted syphilis, followed by sore throat and hoarseness. When first seen in 1879 he was completely aphonic, dyspnoeic on exertion, with dysphagia, and pain over the larynx and cough. These symptoms had existed for some weeks. Projecting from the orifice of the right ventricle, which it fully occupied nearly to its posterior extremity, was a tense, smooth, semi-elliptical tumour, the mucous membrane of which was of a deep red colour and covered with small points resembling the mouths of minute follicles. Both extremities of the tumour were rounded, the posterior being larger than the anterior. With a probe it could be made to recede within the orifice of the ventricle. The mucous membrane covering the tumour *was continuous with the ventricular band*, and the edges of the latter were more rounded and less distinct in outline than in the normal condition. Forced respiration had no effect on the tumour, and on phonation there was no change except that it became more tense. Local applications of copper sulphate for three months greatly reduced the size of the tumour, leaving a wrinkled fold of a pale red colour—relaxed mucous membrane. During phonation this would slightly recede into the ventricle. The voice also became clearer. Suffering no further inconvenience the patient ceased his attendance. The second case was a girl, aged 22, also seen in 1879, and shown by Morell Mackenzie at his clinic. She came of a consumptive family, and was always subject to catarrh of the naso-pharynx and larynx. She often suffered from hoarseness. One morning she woke up with aphonia followed by dyspnoea at nights and later by cough. The left vocal cord was entirely obscured by a large, smooth, pear-shaped tumour of a rosy hue which entirely filled the ventricular orifice. Its posterior border was rounded and anteriorly it was peaked, and its upper surface was flattened. Its mucous membrane *was continuous with that of the ventricular band*. There was no change in form or position of the tumour during forced respiration, or on phonation. It could not be replaced into the ventricle by a probe. Astringent applications improved the laryngitis, but the dyspnoea persisted. The mucous membrane became paler, exhibiting shining points as in the previous case. The tumour became less regular in outline but only slightly diminished in size. Following the proposal of Morell Mackenzie to remove the tumour endo-laryngeally, patient did not again appear at the clinic.

(These two cases are undoubtedly due to inflammatory œdema of the floor of the ventricle, which is confirmed to some extent by the improvement which followed the application of astringents.)

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Semon,<sup>37</sup> in 1884, described a case of "Eversion of the Left Ventricle of Morgagni" in a male, aged 38, who complained of gradual loss of voice for one year, and recently of some pain and difficulty in swallowing. There was no syphilitic history. In the position of the left ventricular band a red mass was seen, and it was difficult to decide whether it was the ventricular band or a new growth. When the patient expired strongly the tumour was distinctly seen to move a little upwards. The left vocal cord could not be seen because the tumour overlapped it even during phonation. Semon concluded that it was the everted left ventricle of Morgagni because it presented all the characters of simple mucous membrane, and appeared to be continuous with the left ventricular band. Though thyro-fissure was suggested no further details were published. (This is probably another example of inflammatory hyperplasia.)

G. W. Major,<sup>38</sup> in 1886, under the title of "Prolapse of the Laryngeal Ventricle," refers to "Prolapse" as occurring more frequently than Eversion, and has attempted to discriminate between the former and the latter. He remarks that the term to be applied to a given case may be decided upon by the extent of the displacement. He maintains that Prolapse does exist with Eversion of the Sacculus (he employs the latter term as synonymous with the Ventricle), while he says Eversion cannot occur without prolapse.

He describes five cases, two examples of "Eversion" and three of "Prolapse," the diagnosis of each case having been made on palpation; upon the ability to replace the tumour with a laryngeal probe, and on the partial retirement of the tumour into the ventricle on phonation. (It has been shown, however, that these features may also be demonstrated in cases of hyperplastic or cedematous folds of protruding mucosa.)

CASE I.—A male, aged 25, gradually developed hoarseness with dyspnoea, following a severe cold and cough. The ventricle was seen to be occupied by "folds of congested tissue" tapering at each extremity. Local treatment caused only slight improvement. Later, the patient developed tubercular infiltration of the larynx with deposit in the lungs.

CASE II.—A female with old syphilitic disease, admitted to hospital in an insensible condition suffering from eclampsia. On recovery from the eclampsia, aphonia and stridulous breathing were observed. Autopsy showed "the right thyroid ala involved by specific disease, and the right ventricle completely everted."

CASE III.—A male, aged 32, under treatment for syphilis, suffering from aphonia and attacks of suffocation. "Eversion of the right ventricle was observed." A year later the ventricle was found to have "spontaneously reposed itself."

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CASE IV.—A male, under treatment for laryngeal stenosis, due to syphilis contracted eighteen years previously. "Prolapse" of the left ventricle was observed.

CASE V.—A male, aged 29, affected with pulmonary and laryngeal tuberculosis. Both laryngeal ventricles were found prolapsed. Astringent applications gave relief.

Massei,<sup>39</sup> F. (Naples), in 1886 (cited by Fränkel<sup>8</sup> in 1893 and Noack<sup>32</sup> in 1898), refers to a case of eversion of the ventricle in a syphilitic patient. Noack<sup>32</sup> says it was due to a syphilitic gumma. (The literature of this case is unobtainable.)

Jellenfy<sup>40</sup> (Budapest), in 1887, in a paper entitled "New Chapter in the Surgery of the Larynx," refers to the few cases recorded in the literature, and discusses the causes and diagnosis of Prolapse of the Ventricle. He mentions having had four cases, but only briefly refers to them in his paper and gives only a few details. He says that in three of these cases there was no dyscrasia, though one cured case developed syphilis later. Two of the patients refused operation. In one case he made small incisions daily at the junction of the ventricular band and the prolapse, and in ten days the whole tumour had disappeared. Noack<sup>32</sup> (Lyons), in 1898, cites Jellenfy,<sup>40</sup> and states that two of the cases were tubercular but on what grounds no evidence is supplied.

Przedborski,<sup>41</sup> L. (Lodz), in 1888, recorded two cases of "Prolapse of the Ventricle." The first, a female with phthisis, complained of intermittent aphonia. A smooth, red fold protruded from between the false and true vocal cords. It was diagnosed as prolapse of the mucous membrane of the ventricle of Morgagni. Treatment with Lactic Acid and Chromic Acid to the fold resulted in distinct improvement in the voice. The second case was a male, aged 65, suffering from bronchitis and emphysema of the lungs, who complained of aphonia and dyspnoea. The right cord was overlapped by six tumours, one being the size of a cherry in the anterior third of the larynx, the other smaller ones reaching as far as the free edge of the cord. They were soft and erectile. On palpation with a probe they could be pushed into the ventricle and gave the impression of being thickened folds of mucous membrane. All the tumours were removed by forceps. The larger tumour was smooth and empty inside. [No microscopic examination was made.]

Gouguenheim<sup>42</sup> (Paris), in 1891, referred to five cases of "Prolapse of the Ventricle," of which he says four were suffering from tuberculosis. It occurred on the right side in all the cases, and the cause appeared to be coughing.

Ruault<sup>43</sup> (Paris), in 1891, in discussion on Gouguenheim's<sup>42</sup> cases, refers to having seen three cases of prolapse in patients suffering from



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tuberculosis of the larynx. Chiari<sup>30</sup> refers to these tumours as hypertrophied folds from the wall of the ventricle.

Botey<sup>44</sup> (Barcelona), cited by Chiari<sup>30</sup> in 1891, recorded a case which Chiari<sup>30</sup> considered could be attributed to a chronic inflammatory hyperplasia. [Original reference not obtainable.]

Beausoleil<sup>45</sup> (Bordeaux), in 1892, recorded a case in a male, aged 32, of "Eversion of the Ventricle" during an attack of acute laryngitis following hoarseness, and referred to the condition of eversion as very rare except in cases of tuberculosis and syphilis. A smooth, oblong, reddish swelling protruded from the left ventricle and covered the vocal cord. On inspiration the swelling diminished slightly. A slight depression was observed separating the ventricular band from the tumour, *i.e.*, there was a definite line of demarcation. The case was treated as ordinary acute laryngitis and the tumour painted with zinc chloride, with disappearance of all symptoms. Moller<sup>5</sup> remarks that this case shows plainly that it was one of inflammatory swelling. Chiari<sup>30</sup> points out that the tumour was evidently a hypertrophied fold of mucous membrane proceeding from the wall of the ventricle and penetrating into the larynx.

Zawerthal<sup>46</sup> (Bologna), cited by Beausoleil<sup>45</sup> in 1892, recorded a case. [Literature not obtainable.]

Scheinmann<sup>47</sup> (Berlin), in 1892, presented at a meeting of the Berlin Laryngological Society, two cases of eversion of the ventricle, in which misuse of the voice in patients suffering from chronic catarrh was said to have caused relaxation of the mucous membrane and local development of "Prolapse." Rosenberg,<sup>48</sup> in discussion, considered that these were cases of thickening of the lower border of the false vocal cord, in view of the fact that it was possible to replace the swelling. Moller,<sup>5</sup> on the other hand, remarks that the appearance and consistency of the swellings indicated that they were not inflammatory swellings but protruding folds of mucous membrane. Referring to this case, he says: "It is obvious that the great demands on the voice, and consequently also on the elasticity of the tissues of the larynx, caused relaxation of the mucous membrane, and local development of prolapse" (by this he means eversion).

(There is no confirmatory evidence that this was a case of true eversion of the ventricle. It was probably an cedematous hyperplasia of the mucosa.)

Schutter<sup>49</sup> (Amsterdam), in 1892, presented at the March meeting of the Medical Society of Groningen, a case of prolapse of the mucous membrane of the sinus of Morgagni, which simulated a malignant tumour of the right vocal cord. [No further details are published.]

Chiari<sup>30</sup> says that a hypertrophied fold of mucosa protruding from the ventricle is adequate for the explanation of this case.

Landgraft<sup>50</sup> (Berlin), in 1894, exhibited at the January meeting of

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the Berlin Laryngological Society, a case of "Eversion of the Ventricle" after the swelling had been removed. The patient suffered from hoarseness owing to defective adduction of the vocal cords. Microscopically the tumour consisted of the same structure as the false vocal cord.

Fränkel<sup>8</sup> (Vienna), in 1894, recorded a specimen of "Prolapse of the Ventricle" from a patient from whom he had twice removed prolapsed mucous membrane, and found, microscopically, that it consisted of cylindrical epithelium, connective tissue, and in the latter, follicles and mucous glands. He concluded, therefore, that the "prolapse" represented the lateral walls, and its inferior surface. Moller,<sup>5</sup> referring to this case, came to the same conclusion, and described it as an inflammatory hyperplasia of the mucous membrane emanating from the wall of the ventricle.

Merrick<sup>31</sup> (Baltimore), in 1895, recorded in a male, aged 48, a laryngeal neoplasm simulating the everted ventricle. It was a soft, ovoid, inflamed tumour filling up the left ventricle, and concealing the left vocal cord and part of the right, and occupied three-fourths of the glottic space. It proved to be a gumma of the left vocal cord. He points out the difficulty of differential diagnosis between a gumma and an eversion of the ventricle when the tumour fills the cavity of the ventricle.

Chiari,<sup>30</sup> in 1895, recorded the case of a male, aged 55, with hoarseness which had gradually developed for four months, and, later, difficulty in breathing. A tumour protruded from the ventricle of Morgagni on each side, three-quarters filling the glottis (Fig. 13). Each could be temporarily replaced into the ventricle with a probe, and showed a similarity to cases previously described as "prolapse of the ventricle." The case was at first diagnosed as such. Later, following piece-meal removal with forceps over a period of three weeks, and the histological findings, Chiari changed his opinion and came to the conclusion that they were chronic hypertrophied folds of mucous membrane proceeding from the wall of the ventricles and protruding into the larynx. Moller<sup>5</sup> also considers that this case was similar to those recorded by Lussan,<sup>6</sup> Leferts,<sup>2</sup> Stoerk,<sup>7</sup> and Koschier,<sup>9</sup> etc.; viz., a hypertrophied fold proceeding from the walls of the ventricle.

William S. Jones<sup>52</sup> (Camden, New Jersey), in 1895, recorded a case of "Prolapse of the Laryngeal Ventricle" in a male, aged 35, with gradually increasing impairment of the voice for four months, following shouting at the top of his voice when in an excited condition. A large, light red mass was observed resting on the left vocal cord, the diagnosis of prolapse of the ventricle being confirmed by Solis Cohen. Jones considered that the ventricle was severed from its attachment to the thyroid-arytenoid muscle during the violent strain and became gradually prolapsed (*i.e.*, everted), this being suggested by the impair-

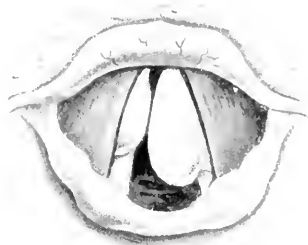
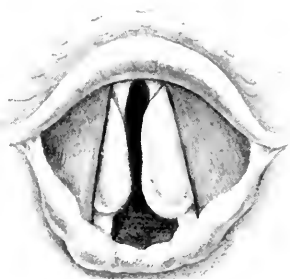
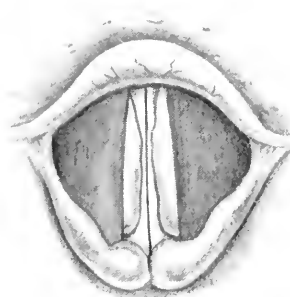


FIG. 10.—Prolapse of both Ventricles of the Larynx.  
(Lefferts' Case.)



During respiration.



During attempted high chest notes.

FIG. 11.—Eversion and Prolapse of both Sacculi Laryngis.  
(Louis Elsberg's Case.)

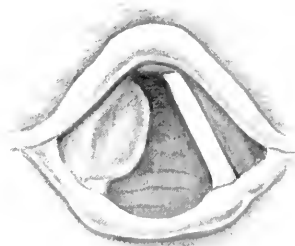


FIG. 12.—Prolapse of the Laryngeal Sac.  
(Solis-Cohen's Case.)

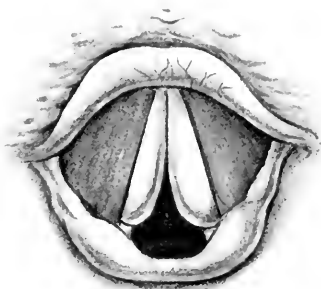


FIG. 13.—Edematous folds of the ventricular mucosa simulating Prolapse of the Ventricle. (Chiari's Case.)



FIG. 14.—Prolapse of mucous membrane of the ventricles of Morgagni. (Schnitzler's Case.)

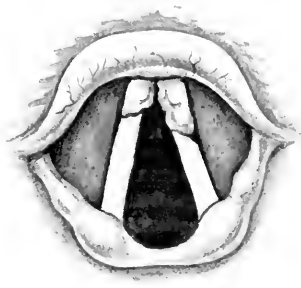


FIG. 15.—Prolapse of the Ventricles of Morgagni. (Moller's Case.)

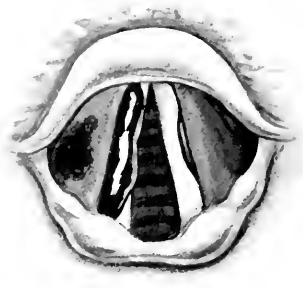
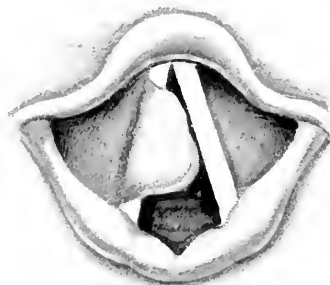


FIG. 16.—Traumatic Laryngitis with Prolapse of the Right Ventricle. (Abraham's Case.)



Before opening the Cyst and evacuation  
of the fluid.



After opening the Cyst, showing the  
everted ventricular wall.

FIG. 17.—Eversion of the left Ventricle of the Larynx secondary to a Cyst involving the Larynx and the side of the neck. (Fletcher Ingals's Case.)

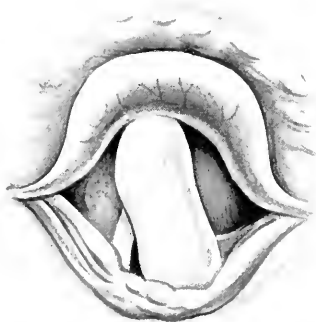


FIG. 18.—A Cyst of the left Laryngeal Ventricle.  
(Joseph Cohen's Case.)



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ment of the voice occurring some time after the cause, also by the increasing dyspnoea. The "prolapse" was replaced many times but always recurred. He advised thyro-fissure but the patient refused; the condition was treated by frequent applications of the galvano-cautery, using an electric needle with a shield on one side to protect the false vocal cord. The aphonia gradually disappeared, leaving only slight impairment of the voice.

Schnitzler<sup>53</sup> (Vienna), in 1895, in his *Klinischer Atlas der Laryngologie*, Taf. xxiv., Fig. 6, gives an illustration of a case of prolapse of the ventricle on each side, but no details are published (Fig. 14).

Chiari,<sup>30</sup> referring to this case, considered that they were hypertrophied folds proceeding from the walls of the ventricles.

Stoerk,<sup>7</sup> in 1897, referred to the case of a male (age not stated) with hoarseness. A tumour the size of a small bean, diagnosed as a polypus, was seen protruding from the left ventricle. It was semi-transparent and fibrous-looking. Later it was diagnosed as Prolapse of the Sinus Morgagni. The growth was removed endo-laryngeally by guillotine, and histologically showed a chronic inflammation, with hypertrophy of the sub-epithelial connective tissue and simultaneous cystic degeneration of the gland lumina, which was probably the cause of the existing hyperplasia. Moller,<sup>5</sup> in 1905, refers to this case as one of inflammatory hyperplasia.

Koschier,<sup>9</sup> in 1897, described a case of acute hyperplasia (Prolapse) of the mucous membrane of the ventricle within a period of twenty-four hours following an attack of laryngitis, which disappeared spontaneously when the laryngitis disappeared. As previously stated, he was able to produce this experimentally in the dog by penetrating the larynx with a needle. He found that the base of the prolapse was situated exactly along the muscular band in the ventricle (described by Albrecht<sup>28</sup>), and concluded that the "prolapse" may be ascribed to cedema of the tissues accompanying an inflammation of the mucous membrane. Koschier<sup>9</sup> in the same year also described histologically 19 cases of so-called Prolapse of the ventricle, 16 of which proved to be chronic hyperplasia of the mucosa (see Histology, p. 273).

Zwillinger<sup>54</sup> (Budapest), in 1897, recorded a case of so-called prolapse of the ventricle of Morgagni. The patient, aged 27, suddenly developed hoarseness and a cough following exposure to wet and cold. On examination of the larynx, the left vocal cord was seen covered by a dark reddish grey fold of mucous membrane, which was quite distinct from the ventricular band. The fold protruded from the left ventricle of Morgagni, and its posterior portion was only to a very small extent movable by means of a probe, and reposition could not be effected. It presented the condition usually known as prolapse of the ventricle of Morgagni, apparently the lateral wall of the ventricle being affected, and not the lower aspect of the ventricular band.

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In the discussion which followed, Polyak<sup>55</sup> (Budapest) expressed the opinion that this was not a case of prolapse, but a partial hypertrophy of the ventricular wall, and agreed with Fränkel<sup>8</sup> that complete prolapse of the ventricular mucous membrane is impossible. He preferred the term "*Chorditis vocalis superior hyperplastica*" for this case.

Lussan<sup>6</sup> (Paris), in 1898, in his Thesis on "Prolapse of the Ventricle" of Morgagni, recorded a case—cited by Moller<sup>5</sup> in 1905 as one, judging from its description—of inflammatory hyperplasia, and similar to those of Lefferts,<sup>2</sup> Stoerks,<sup>7</sup> and to the eighteen cases of Koschier's,<sup>9</sup> etc. [Literature unobtainable.]

Lichtwitz<sup>56</sup> (Bordeaux), in 1898, records a case of "Prolapse" of the right ventricle two months after a similar condition on the left side had been cured by operation. The condition was said to have occurred in a male patient, a pilot, aged 39, after a violent sneeze, which caused a severe pain in the left side of the throat followed by gradually increasing hoarseness. On examination the left side of the larynx was found congested and a dull red tumour covered the left vocal cord. The "Prolapsed Ventricle" was removed by cutting forceps under cocaine. The voice returned, and remained clear for two months when hoarseness again recurred. On re-examination the right ventricle was found "prolapsed" and was removed in the same way. The patient made a complete recovery.

Monselles<sup>27</sup> (Florence), in 1900, recorded the case of a male, aged 33, who two years previously had suddenly lost his voice while sneezing; he was treated for some time unsuccessfully for laryngeal catarrh. Then a neoplasm of the larynx was diagnosed. On examination the author found a pear-shaped growth, the size of a large pea, masking two-thirds of the anterior portion of the right vocal cord, and projecting into the interior of the larynx. The growth was mobile during inspiration and expiration and on phonation, a proof that it did not adhere to any other portion of the larynx. Its surface appeared smooth, shining, reddish-brown in colour, and apparently it had a soft consistence. The growth was removed. A later examination showed a light red coloured proliferation, which proceeded from immediately below the false vocal cord, projecting towards the median line and covering the underlying vocal cord. Assuming it to be a residue of the already removed polypus, he attempted also to remove it, but found that it differed materially from the latter, inasmuch as it was tough and could not be grasped by the forceps; it did not adhere in any way to the vocal cord, and, therefore, he concluded it was a case of eversion of the ventricle of Morgagni.

Histologically the first growth proved to be a fibroma, consisting principally of connective tissue in various stages of development. The eversion itself, the author says, was due to a sudden attack of sneezing, and he assumed that a small blood-vessel in the submucous



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connective tissue ruptured, giving rise to a hæmorrhagic infiltration into this tissue, the swollen tissue then pushing forward the covering mucous membrane, and causing the eversion. He attempted to reproduce the condition artificially in 33 cases, post-mortem, without success; in every case the mucous, instead of the submucous membrane was torn on attempting to draw out the mucous membrane of the ventricles.

Lublinski<sup>57</sup> (Berlin), in 1900, recorded a case (cited by Monselles<sup>27</sup>). [Literature unobtainable.]

Ramon de la Sota<sup>58</sup> (Seville), in 1902, in a paper entitled "Prolapse of the Laryngeal Ventricle," discussed the causes and pathology of prolapse. [Original paper unobtainable.]

Delsaux<sup>12</sup> (Brussels), in 1902, exhibited at the June meeting of the Belgian Oto-Rhino-Laryngological Society, Brussels, the case of a patient with persistent aphonia due to "prolapse of the ventricles of Morgagni" following voice strain and accompanied by severe dysphagia. The case had been diagnosed and treated for a long time as one of tuberculosis.

Ilyin<sup>59</sup> (Moscow), in 1903, is cited in the Surgeon-General's Catalogue as having recorded a case. [Literature unobtainable.]

Sturmann<sup>60</sup> (Berlin), in 1904, presented at the November meeting of the Berlin Laryngological Society, a case in which the ventricular mucosa protruded and covered the vocal cord on both sides. Treatment by rest and inhalation caused almost entire retraction.

Heymann<sup>61</sup> (Berlin), in 1904, at the February meeting of the Berlin Laryngological Society, referred to a case showing the mucous membrane much prolapsed on both sides, which, following treatment by injections of menthol, improved to such an extent that only a red velvety, and partly replaceable, swelling remained on the left side.

Moller,<sup>5</sup> in 1905, described the case of a policeman suffering from phthisis, with a history of hoarseness for many years. There were lumpy protuberances on the lower border of both ventricular bands covering during respiration the anterior third of the vocal cords (Fig. 15). The mucous membrane was of normal appearance. On phonation the swellings entirely disappeared. On complete abduction of the cord, and on complete relaxation of the muscles, the swellings suddenly sprang out of the ventricles.

Delsaux,<sup>12</sup> in 1905, under the title of "Eversion or Prolapse of the Ventricle of Morgagni," also recorded another case, a male, aged 43, who complained of persistent hoarseness following tonsillitis one and a half years previously; he was worse during the last three months, and had inspiratory stridor. The whole larynx was congested, and there was a swelling the size of a hazel-nut under the right ventricular band. The tumour was removed with a galvano-cautery snare; it "proved to be the everted ventricle," and was followed by complete cure.

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When exhibiting this pathological specimen, Delsaux<sup>12</sup> suggested that a Prolapse was a hernia through the natural orifice of the ventricle, and an Eversion through the lateral wall of the larynx.

Heyninx<sup>62</sup> (Brussels), in discussion on the above case, suggested that the conditions were the opposite from that just stated.

Moller,<sup>5</sup> in 1906, observed a case in which during intonation the vocal cords were normal, but if they were abducted a few mucous prominences were visible covering the anterior part of the vocal cord. Moller<sup>5</sup> stated that he had seen, in two dogs, real non-inflamed mucous prolapse of the sinus Morgagni, and had studied them under the microscope.

Abraham,<sup>63</sup> in 1907, referred to a case of traumatic laryngitis with "eversion of the laryngeal ventricle" caused by a heavy blow on the right side of the larynx. The patient became aphonic and complained of dysphagia. An oval, much congested tumour covered the entire right vocal cord (Fig. 16). A cure was effected by rest, cold compresses, and astringent sprays.

Reardon<sup>64</sup> (New York), in 1909, recorded the case of a female singer, aged 40, who became hoarse after an attack of follicular tonsillitis followed by dyspnoea and cyanosis. The right ventricle was so oedematous (it was the size of a pigeon's egg) that it covered the right cord. Intubation gave immediate relief, and on the following day the larynx was normal.

Navratil<sup>65</sup> (Budapest), in 1910, at the January meeting of the Rhino-Laryngological Section of the Royal Hungarian Medical Society, mentioned a case of prolapse of the mucous membrane of the ventricle cured by removal with a cold wire snare.

Lang<sup>66</sup> (Budapest), in 1914, recorded a case of "prolapse of the ventricle of Morgagni" which gave rise to inspiratory stridor and cyanosis. The patient was brought into hospital from the street unconscious and suffering from apnoea. Immediate tracheotomy was performed and artificial respiration for eight hours. Later, following failure at endo-laryngeal removal, thyro-fissure was performed.

Scheier<sup>67</sup> (Berlin), in 1918, exhibited at the April meeting of the Berlin Laryngological Society, a case of an enormous "prolapse" of the ventricle in a soldier, aged 46, who a year previously suddenly developed severe hoarseness. A number of light red, somewhat oedematous outgrowths projected from the ventricle on both sides, the vocal cords being scarcely visible. The tumours were replaceable by a probe. Microscopical examination demonstrated inflammatory infiltration.

Jobson Horne,<sup>13</sup> in 1921, exhibited at the February meeting of the Section of Laryngology, Royal Society of Medicine, a larynx in which the left ala of the thyroid cartilage was involved in a gummatous necrosis, which he stated had led to the detachment,

## Prolapse of Laryngeal Ventricle

prolapse, and eversion of the mucous membrane lining the ventricle; this suddenly gave way, and protruded into the larynx and caused the death of the patient. (No section of this specimen having been made, it is impossible at the present time to verify the statement, and to classify it as a true eversion of the ventricle).

### GROUP II.—(a) *Retention Cysts of the Ventricle as a Cause of its Eversion.*

Koschier,<sup>9</sup> in 1897, stated that in two of his nineteen cases the tumours which protruded from the ventricle gave the appearances of so-called prolapse, yet were shown microscopically to be retention cysts.

Fletcher Ingals<sup>68</sup> (Chicago), in 1899, recorded a case of "Eversion of the Ventricle of the Larynx and cyst involving the larynx and side of the neck," in a male aged 39, who complained of difficulty in speaking. The tumour externally measured  $1\frac{1}{2}$  inches in diameter, and was situated on the right side immediately below the angle of the neck. Nine years previously an abscess had developed in the same position; it was opened and pus evacuated—it formed again, two years later. A year later the swelling recurred, and appeared to consist of a sac containing air which could be made to collapse on pressure, but refilled immediately when the pressure was removed. There was no cough and the voice was a coarse whisper. When pressure was made on the tumour the patient was unable to speak. On examination, a tumour of cystic appearance was seen bulging from the right side of the base of the tongue against the epiglottis. It extended downwards on the right side of the larynx, causing bulging of the ventricular band so as completely to hide the right vocal cord and ventricle, covering on attempted phonation the left cord and part of the left side of the larynx (Fig. 17). The cyst was emptied by aspiration, and contained thick mucilaginous semi-transparent fluid.

Following this the voice improved and the tumour at the base of the tongue and side of the larynx disappeared, leaving a smooth, reddish tumour,  $\frac{5}{8}$  inch in length and  $\frac{3}{8}$  inch in its other diameter, projecting from the right side of the larynx above the vocal cord (Fig. 17). This was considered to be a prolapsed ventricle. Under 10 per cent. cocaine and with a wire snare the tumour caused by the "everted ventricle" was removed, leaving only slight hoarseness of the voice. No later notes were published.

[This was, doubtless, primarily a cyst, secondarily everting the ventricle.]

Lawson Whale,<sup>69</sup> in 1920, at the December meeting of the Section of Laryngology, Royal Society of Medicine, in a discussion on Frederick Spicer's case, referred to a patient he had seen with a tumour protruding from the laryngeal ventricle. He removed it, and the diagnosis lay between an eversion of the ventricle or a fibroma. A report by Prof.

S. G. Shattock on a microscopical section of the specimen, 1st June 1921, is to the effect that it is not an eversion, since the interior of the sac is lined with columnar epithelium, whereas, if an eversion, it would have had no epithelial lining whatever. Lastly, there are no glands in connection with the wall. Shattock considers it most probable, therefore, that the cavity is that of a retention cyst, the mucosa over which has become covered with a squamous epithelium from its exposure to the passage of air through the glottis. [This is similar to two of the nineteen cases of so-called prolapse of the ventricle recorded by Koschier<sup>9</sup> (see p. 341).]

Joseph Cohen<sup>70</sup> (Cologne), in 1921, recorded a case of cyst of the left ventricle of Morgagni, and referred to their extreme rarity in this situation. He found from an investigation of the statistical works of Salamon,<sup>71</sup> Schwartz,<sup>72</sup> Ullrich,<sup>73</sup> Moure,<sup>74</sup> and Glas,<sup>75</sup> that amongst the records of 154 cysts of the larynx only 13 originated in the ventricle. He had only recently come across one case during twenty years, in a female, aged 67, who had suffered from hoarseness and difficulty in speaking for several months, with stridor during sleep. A very large greyish-glassy tumour occupied the whole of the glottis except a small triangular space (Fig. 18). It was extremely mobile, and during phonation was lifted up into the upper laryngeal space. It was removed by a wire snare; after removal a large patent ventricle was observed. Cohen suggested that either an initial prolapse of the mucous membrane of the ventricle had occurred with formation of a cyst in the mucous membrane, which gradually occupied or invaded the entire prolapse, or that the cystic growth had pushed the mucous membrane of the ventricle (the ventricular walls) into the lumen of the larynx. (The latter suggestion is the more likely explanation.)

## *(b) Neoplasms of the Ventricle as Causes of its Eversion.*

Chappell<sup>33</sup> (New York), in 1894, referred to a case of bilateral everted ventricles and prolapsed mucous membrane. The patient suffered from hoarseness and dyspnoea; the tumours were removed with a laryngeal guillotine. Hoarseness and difficulty in breathing disappeared. The patient returned six months later with marked dyspnoea and swelling covering the right vocal cord. The tumour was found to be a carcinoma. Chiari<sup>30</sup> considers that the tumours first removed were hypertrophied folds of ventricular mucosa.

Koschier<sup>9</sup> (Vienna), in 1898, described an anatomical specimen of "so-called Prolapse of the Ventricle," obtained from a male patient who died from carcinoma of the kidney. No laryngoscopic examination was made during life. A pear-shaped tumour protruded from the anterior half of the ventricle, distinctly separated from the true and false vocal cords. It was smooth, cedematous, and of a pale red colour, and could be readily pushed into the ventricle. Microscopically it was

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possible to distinguish how the mucous membrane, protruding from between the lower surface of the false vocal cord and the upper surface of the true cord, enveloped the whole tumour, retaining a sharply defined line of demarcation. The "prolapse" was due to the growth of a connective tissue tumour—a myxo-fibroma—having its origin in the submucous tissue of the wall of the ventricle, and by its growth displacing the mucous membrane of the ventricle, without adhering to it, towards the interior of the larynx. This is a genuine example of "eversion of the ventricle" caused by a tumour growing in the submucous membrane, which by its weight caused displacement not only of the mucous membrane of the ventricle, but also of the sacculus, since the latter was seen as a small slit in the anterior part of the larynx. Such cases require a long time for their formation and never spontaneously disappear. Moller<sup>5</sup> considers that this case was one of actual eversion of the ventricle.

Noack<sup>32</sup> (Lyons), in 1898, gave details of a case of Moure's (previously unpublished) of so-called ventricular eversion; a male, aged 27, with hoarseness for several years. A smooth, globular protuberance—reddish in colour, the size of a gooseberry—covered the anterior two-thirds of the left cord, and had every appearance of prolapse of the ventricular mucosa. It was diagnosed as ventricular eversion. Attempts at removal with cutting forceps failed, on account of the hardness of the tumour. It was removed later by galvano-cautery snare. Histologically it was shown to be an angeio-myxomatous tumour. Noack remarks that since it had all the clinical signs of eversion of the ventricle of Morgagni, if it had not been proved histologically to have been otherwise, the case would have been published as such. He thinks that, as in his own case, others of his colleagues, deceived by appearances, have assumed that they were removing the ventricular mucous membrane, whereas very likely their case was like the one he has described.

Garel,<sup>11</sup> in 1901, recorded, under the title of "Eversion of the Ventricle," the case of a male, aged 57, with laryngeal symptoms for two months followed by somewhat sudden hoarseness of the voice. In the anterior portion of the left ventricle a tumour projected. There was no change in the appearance of the tumour during respiration and phonation. The patient died from progressive anæmia without any connection with the laryngeal condition. Autopsy showed that the tumour extruded from the left ventricle, pushing the ventricular band upwards. It was the size of a large pea and freely mobile, and was attached to the external wall of the ventricle by a long, slender pedicle 1 cm. in length. The ventricular mucosa was not everted nor was it the seat of inflammatory reaction. Microscopical examination showed normal ventricular mucosa with only a very few glands present in the section; the growth was a fibro-lipoma.

CONCLUSIONS FROM THE RECORDED CASES OF SO-CALLED  
"PROLAPSE" OF THE VENTRICLE WITHOUT INVOLVE-  
MENT OF THE SACCULUS.

**Statistics.**—Chiari,<sup>30</sup> in 1895, in a review of the literature, stated that up to that date 40 cases had been diagnosed as "Prolapse of the Ventricle." The present writer has confirmed the number recorded by Chiari,<sup>30</sup> and included abstracts of these cases in his monograph. He has in addition traced a further 45 cases—making a total of 85 recorded up to the present time.

**Etiology.**—One of the predominant, co-existing features of so-called "Prolapse" is chronic catarrh and ulceration of the respiratory tract, the inflammatory condition coming to involve the ventricle itself. Coughing may or may not be present. In one case the condition was said to have arisen *during* a violent attack of coughing (Solis Cohen <sup>36</sup>).

One author, believing that these cases were true eversions of the ventricular wall, and not due to swelling of the mucosa, has assigned, as the only direct cause, the violence to which the tissues are subjected during the act of coughing, although how this operates, he admits it was not easy to understand, unless, as he says, one presupposes a relaxed condition of the mucous membrane (Bosworth <sup>22</sup>).

It is said that voice strain, in some cases, may produce local relaxation of the mucous membrane in persons suffering from chronic catarrh, just as cough accompanying chronic catarrh may produce the same thing (Scheinmann <sup>47</sup>).

The condition of true eversion, if it should occur under such conditions of relaxation of the mucosa and coughing, would be best explained, perhaps, by Shattock's <sup>75</sup> theory of negative pressure produced by the blast of air liberated above the cords during the act of coughing.

That a concussion or a severe blow on the exterior of the larynx might be sufficiently powerful to throw all the mucous membrane out of the cavity on to the vocal cord is hardly conceivable, although this has been suggested (Jellenfy,<sup>40</sup> Coakley <sup>76</sup>). In one case, traumatism was supposed to have been the cause of an inflammatory œdema leading to "prolapse" of the ventricular wall (Abraham <sup>63</sup>).

In view of the fact, however, that most, if not all, of the cases of so-called "Prolapse" are due to inflammatory swelling of the ventricular mucosa, the condition of eversion, except

## Prolapse of Laryngeal Ventricle

in connection with cysts and neoplasms, need not be further discussed.

A simple, true eversion is well-nigh impossible, owing to the adhesion of the ventricular mucosa to the surrounding parts and its connection above with the sacculus, the eversion of which would be entailed by that of the ventricle.

Mucosal or submucosal retention cysts and neoplasms may produce "Eversion" by the displacement which the growth involves, or by the traction due to their weight. The writer refers later to the possibility of true eversion of the ventricle occurring slowly and by degrees—secondarily to, and as a final stage in, eversion of the sacculus. This is probably an explanation of Fletcher Ingal's<sup>68</sup> case.

Tuberculosis and syphilis are supposed to be predisposing causes, and it is said—in a general way—that a considerable number of the patients were suffering from one or other of those diseases.

Garel,<sup>11</sup> in 1901, stated that Gouguenheim,<sup>42</sup> in 1889, had expressed the opinion—from the five cases he recorded of ventricular tumours presenting all the signs of prolapse—(three occurring in patients suffering from tuberculosis, and one doubtful) that "prolapse" of the ventricle is *mainly attributable* to tuberculosis. He holds that this view is exaggerated, though to some extent tenable, since he says many cases are *associated* with tuberculosis.

Dundas Grant,<sup>77</sup> in a recent discussion (1921), has referred to Gouguenheim's paper as showing that *most cases* of so-called prolapse of the ventricle *were tuberculous*, and has stated that his own opinion coincides with this.

Reference, however, by the present writer, to Gouguenheim's<sup>42</sup> original paper, shows that there is nothing to lead the reader to infer that the tuberculous lesions were situated in the larynx; on the contrary, allusion is made only to the presence of the usual pulmonary signs. Again, Gouguenheim accepts the assumption advanced by G. W. Major<sup>38</sup> (Montreal) in 1887, that the "prolapse" is caused by the "violence of the fits of coughing" in tuberculous patients; and he concludes that the presence of tuberculosis is consequently a dominant factor. He adds that "the occurrence of prolapse is facilitated by morbid alteration, and tuberculosis is the lesion which most easily would provoke this condition."

Hence it is plain that there is no laryngoscopic evidence to show that laryngeal tuberculosis was present in any of

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the 5 cases recorded by Gouguenheim, and its co-existence as a causative factor has only been surmised.

The presence in laryngeal tuberculosis of an intense red, more or less raised fold on the upper surface of the vocal cord, along the floor of the ventricle, corresponding to the outer limit of the vocal cord, has been observed by some, but this fringe of granulation tissue must not be confused with folds protruding from the ventricle.

Tuberculosis may undoubtedly lead to spurious forms of, and simulate, a proper Eversion of the Ventricle or the Sacculus, as in the specimen preserved in the Museum of Golden Square Hospital, referred to later.

Moure<sup>74</sup> has suggested that the formation of these ventricular folds may possibly in some cases be due to syphilis, but of the correctness of this no pathological evidence is forthcoming.

The breaking down of a gumma, in the region of the ventricle might conceivably lead to loosening of the ventricular wall and Eversion, but the specimen recently shown by Jobson Horne,<sup>13</sup> on 4th February 1921, at a Meeting of the Section of Laryngology, Royal Society of Medicine (see p. 344), cannot be accepted as such without further investigation.

Ruault<sup>43</sup> has referred in discussion to the rarity of tubercular hyperplasia of the ventricle simulating so-called Prolapse, and has found from a series of 167 cases of tuberculosis of the larynx, that only 3 cases of "prolapse" occurred.

A study by the present writer of 82 cases of so-called Prolapse recorded in the literature reveals the fact that laryngoscopic signs of laryngeal tuberculosis were present in only 3 cases; whilst in 4 cases the local condition was only associated with tuberculosis in the sense that it co-existed with pulmonary phthisis.

Syphilitic lesions of the larynx have only been observed on autopsy in 2 cases, and laryngoscopic evidence of gumma only in one; whilst in the remaining 5 cases, although syphilis co-existed with the laryngeal condition, its action as the causative agent of the latter was only surmised. Tumours accounted for 5 cases (4 benign and 1 malignant); cysts 5. Of the remaining 57 cases chronic catarrh was present in the majority.

Hence it is clear that beyond the inflammation and ulceration to which tuberculosis and syphilis give rise, with their accompanying coughing, there is no ground whatsoever for believing that they play any special part in the production of so-called Prolapse.



# Prolapse of Laryngeal Ventricle

There is no clear example amongst the whole series of cases recorded of a simple Eversion of the ventricular wall unaccompanied with an inflammatory swelling.

*Age.*—The condition in every case was observed in full adult life varying from the age of 20 to 65.

*Sex.*—In only 30 of the cases recorded was the sex definitely stated, and of these 25 were males and 5 females.

*Side.*—In only 39 cases was this recorded; 12 were bilateral; and 27 unilateral (15 on the right, and 12 on the left side).

**Symptoms.**—These are a chronic cough or a single severe attack of coughing in a patient suffering from chronic catarrh of the pharyngo-laryngeal tract and hoarseness ranging from a coarse whisper to a gradual or sudden complete aphonia, which may be intermittent or persistent, and may have existed for from twenty-four hours to many years. The aphonia is caused either by the mucous membrane protruding between the vocal cords and mechanically preventing adduction, or by its lying on the vocal cords and interfering with their vibration.

In one case a harsh voice had existed since infancy. Dyspnœa, inspiratory stridor, and even cyanosis have been observed in many cases, as well as dysphagia, and pain over the larynx.

**Laryngoscopic Appearance and Diagnosis.**—Morell Mackenzie<sup>4</sup> stated that such a swelling was “the only intelligent source of error in the diagnosis of benign growths of the larynx.” It can be clinically diagnosed by its well-defined appearance; viz., a longish, or pear-shaped, smooth or œdematous-looking tumour, representing all the characters of mucous membrane, or differing only little in appearance from the adjoining mucosa, of a reddish or pale red colour, distinct from the true and false vocal cords, protruding from the ventricle, and covering partly or entirely the true cords. The tumours have been described as tapering anteriorly, the posterior extremity being more rounded, and the upper surface flattened. The anterior and posterior borders of the tumour are said always to fall sharply to the level of the vocal cord (Jellenfy<sup>40</sup>). The swelling may vary in size from a mere fold to that of a small cherry (Solis Cohen<sup>36</sup>), or of a pigeon's egg (Reardon<sup>64</sup>). It is soft, easily indented with a probe, and can be readily replaced or tucked into the ventricle by means of a bent probe—to protrude again immediately on coughing. If in conjunction with cyst formation, the tumour may look pale and tense, with a greyish, glassy appearance. In one case the edges of

the ventricular band were quite indistinct during respiration, but were *sharply defined* during phonatory effort (Elsberg<sup>35</sup>). In another, the diagnosis was made partly on the fact that there was *a lack of a line* of demarcation between the ventricle and the ventricular band (Solis Cohen<sup>36</sup>). It is also said that prolapse can be diagnosed by the partial rolling of the mass out of sight, into the ventricle on phonation, and, in rare instances, its complete disappearance, leaving a flabby, wrinkled fold; whilst on respiration it protrudes more distinctly. This is exactly the reverse of what was observed in Frederick Spicer's<sup>1</sup> case, in which, on phonation, the tumour became enlarged (from inflation). Again, in two cases recorded by Nolan Mackenzie,<sup>17</sup> forced respiration had no effect upon the tumour, and no change was observed on phonation, except that it became more tense. It has been shown that shrinkage follows the application of astringents to the swelling, which confirms its acute inflammatory nature in some cases.

**Differential Diagnosis.**—New growths, benign or malignant, may be mistaken for it, and it has been found difficult, not only to diagnose it from a new growth, but also from the ventricular band (Semon<sup>37</sup>). New growths, however, are usually irregular in outline and firmer in consistence. Benign growths are generally pedunculated and readily movable. It has been mistaken for a polypus (Waldenburg's<sup>34</sup> case). It may be diagnosed from a fibroid growth by its size, absence of a pedicle, its colour and smooth surface, and its softness on palpation (Lefferts<sup>2</sup>). A fibroma, a fibro-myxoma, a fibro-lipoma, and an angeio-myxoma, have each been mistaken for Prolapse of the Ventricle. From a cyst it may be diagnosed by puncture, or microscopical section after removal. It may be distinguished, again, from simple Eversion of the Sacculus since the protrusion in the latter case is confined to the anterior portion of the elongated ventricular opening, and conclusive proof of the nature of the protrusion (if removed) may be found on microscopical examination (Uckermann's<sup>79</sup> case). Malignant growths are attached by a broad base, and may be irregularly nodular and firm on palpation, and accompanied with glandular involvement. Carcinoma has been confused with it (Chappell's<sup>33</sup> and Schutter's<sup>49</sup> cases). From tuberculosis it may be excluded by the absence of other symptoms, and rendered improbable by the rarity of tubercular disease of the ventricle, as is shown by the statistics of Ruault,<sup>43</sup> and by those gathered by the present writer from the records of all the published cases. One

## Prolapse of Laryngeal Ventricle

case has been diagnosed as tubercular, and treated as such (Delsaux's<sup>12</sup>). It may be mistaken for a syphilitic gumma; the latter, however, is usually unilateral, firm in consistence, and not susceptible of being re-inserted into the ventricle. The diagnosis from a gumma is difficult when the tumour fills the laryngeal cavity (Merrick's<sup>51</sup> case).

**Treatment.**—If causing no inconvenience no treatment is necessary. If, however, marked dyspnœa or stridor is present it may be necessary to remove the tumour. Amongst the 82 cases recorded, urgent symptoms requiring immediate operation only occurred in the two cases referred to later. In acute cases, rest and inhalations, cold compresses along with astringent sprays and injections of menthol, have been successfully employed with disappearance of the swelling after the accompanying laryngitis has cleared up. Intubation has been employed in one case (Reardon<sup>64</sup>). In more chronic cases daily replacement of the swelling with a bent probe, followed by painting with astringents, *e.g.*, Persulphate of Iron, Sulphate of Copper, Iodide of Zinc, Chromic or Lactic Acids have effected relief and even cure.

The tumour has been regarded by one author as a sort of incarcerated hernia, and in several cases he attempted to shut off the circulation by a series of superficial incisions over its contour, thus successfully reducing the "Prolapse" (Jellenfy<sup>40</sup>).

The galvano-cautery has been employed in one case (W. S. Jones<sup>52</sup>), and it is said that a swift cure may be effected by this method (Delsaux<sup>12</sup>). In chronic cases in which marked dyspnœa or stridor were present, removal has been effected endo-laryngeally by forceps, the cold wire snare, or laryngeal guillotine. Thyro-fissure has been performed in one case, under the belief that endo-laryngeal removal might result in stripping of the ventricle—*i.e.*, turning the ventricle inside out (Lefferts<sup>2</sup>); and a preliminary tracheotomy, followed by thyro-fissure, has been carried out in a second case on account of stridor (Lang<sup>66</sup>). In a case of eversion, secondary to cyst formation, the cyst was first punctured, and the everted ventricle was later removed by means of a wire snare (Fletcher Ingals<sup>63</sup>).

*(To be concluded.)*

# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

February 17th, 1922.

*Chairman*—Dr A. A. GRAY, Vice-President.

**Otitic Meningitis**—G. J. JENKINS, F.R.C.S.—Mr Jenkins showed five cases of infection of the meninges *via* the labyrinth, treated by translabyrinthine drainage, with recovery. Three additional similar cases had been written to, but they had not presented themselves. All were cases of septic meningitis presumably arising by infection through the labyrinth, the labyrinthitis in most of them being of recent origin.

CASE I.—T. J. F., male, aged 30. Admitted on 19th June 1921, with severe occipital headache, some neck rigidity: temp.  $101^{\circ}$  F., foul otorrhœa and œdema over the right mastoid. There was no vomiting.

Examination by Mr Jenkins, 21st June: patient somewhat drowsy; he stated that he had had discharge from the right ear for twelve months, deafness for eighteen months, and complete deafness in right ear for a few days: vertigo, which he could give no description of, on two occasions, one a month before, and again four days ago: vomiting, one month, and again six days ago: headache, frontal and occipital, now continuous and severe. He lay on his right side with definite head retraction, and with tenderness of posterior cervical muscles. Patellar jerks feeble but equal; plantar flexion; abdominal absent; pupils reacting to light.

Right ear—foul discharge; T.M. absent; mastoid thickening and tenderness. Left ear—foul discharge and no T.M. Tuning-fork tests unreliable: he cannot hear conversational voice in right ear, and amount of hearing in left is difficult to ascertain. Spontaneous nystagmus, with eyes deviated to left; fine irregular movements; with eyes to right, *nil*. Fundi not examined; Rhomberg tests not applied. Caloric test; hot water to right ear had no effect on nystagmus; cold water to left not applied.

Operation: lumbar puncture; cerebro-spinal fluid turbid, no clotting; total protein, 0.04 per cent.; sugar, a trace; chlorides, 0.677 per cent.; cells, 960 per cm. Differential count: polymorphs, 77 per cent.; lymphocytes, 21 per cent.; endothelial cells, 2 per cent.; films, occasional paired cocci; culture sterile; negative Wassermann. Radical mastoid—Right ear: dense, outer antral wall with deep layer of cells containing pus extending back to sinus: fistula in external canal; stapes not seen; inferior labyrinthotomy and translabyrinth drainage: injury to facial nerve in internal auditory meatus.

24th June: Free flow of cerebro-spinal fluid; lumbar puncture, cerebro-spinal fluid still turbid. 30th June: cerebro-spinal fluid shows protein, 0.02 per cent.; sugar diminished; chlorides, 0.731 per cent.; cells, 8 per cm. all lymphocytes. Progressed to complete recovery.

9th November 1921: Patient again admitted. Severe left-side headache;

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groaning delirium; vomiting; absolutely deaf, no nystagmus, knee-jerks present; plantar, right present, left(?) 2 P.M. examined by Dr Jenkins: patient excited; completely deaf; questions in writing. Reads badly on account of refraction error. Can be roused to answer questions, but condition of patient makes him a bad witness. Shouts his answers. History of complete deafness, vertigo and vomiting coming on about five days ago. He had been quite well until this attack.

Tenderness over left mastoid; no obvious oedema; much pus in left meatus. Granulations in left middle ear: right ear still discharging; ? slight paresis of left face; head straight; slight rigidity of neck. Plantar reflexes flexion; abdominal reflexes present, feeble; knee-jerks present, feeble. Nystagmus: a spontaneous nystagmoid movement with eyes deviated to the right, very fine and irregular, and doubtful as to nature. Caloric test; with hot water in left ear, no effect.

Operation; lumbar puncture; cerebro-spinal fluid cloudy. Protein, 0.05 per cent.; sugar, trace; chlorides, .633 per cent.; cells, 433 per cent.; polymorphs, 75 per cent., lymphocytes, 25 per cent.; plasma, *nil*; micro-organism, *nil*, directly or culturally. Radical mastoid, dense outer wall; cholesteatoma; large opening into external canal. Seventh nerve free in granulations. Granulations in middle ear. Superior and inferior labyrinthotomy. Opening made into internal auditory meatus. Cerebro-spinal fluid in *small* quantity.

11th November: cerebro-spinal fluid coming away freely. Facial paralysis left side. No increase of nystagmus or nystagmoid movement noted. Progressed to cure.

CASE II.—A. W., male, aged 21. Admitted 15th December 1921. History difficult to obtain as patient somewhat torpid. Headaches: five weeks in occipital region; worse for three or four days and seemed worse at night; discharge from both ears as long as he can remember. Earache off and on for years: bad in left ear a few days ago; always slightly deaf: thinks completely deaf in right ear since 1918. Vomiting for seven days.

Ears: general mastoid tenderness on left side; offensive discharge from both ears; much swelling and redness of the posterior wall of meatus on both sides, on right side more than left. Postero-superior perforation of both tympanic membranes. Granulation in right ear. Tuning-fork test; Weber to left; Rinne, left, negative to C<sub>2</sub>, right, to left ear. Bone conduction good in left ear; hearing to conversational voice, right *nil*, left 12 ft. Nystagmus: eyes to left, coarse mixed nystagmus, with often a prolonged slow phase to the right; eyes to right, *nil*; slight paresis of the left external rectus muscle; no facial paresis. Reflexes: abdominal, present both sides and equal; knee-jerks, good, equal; plantar, both flexor equal; no rigidity or tenderness of the neck muscles. Rombergism: falls to the left. Caloric test: hot water in right ear, no effect; no change in spontaneous nystagmus; cold water in left ear not tried. Eyes: right, disc swollen and margins flabby; left, normal. Lumbar puncture: 5 c.c. slightly turbid cerebro-spinal fluid, about 400 cells to c.mm., almost all lymphocytes and a great many plasma cells; increased sugar. Note similarity of this finding to such as is usually obtained in brain abscess, etc.

Operation: left ear, radical mastoid; dense mastoid with deep layer of small cells; cholesteatoma; large fistula in external semicircular canal:

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granulations in middle ear; descending process of incus destroyed; stapes not recognised. Right ear, radical mastoid; condition similar to that found in left ear in every particular. Superior and inferior labyrinthotomy. Internal auditory meatus not opened at this operation on account of report of cerebro-spinal fluid.

*16th December* (day after above operation): general condition worse; mentally worse; complained of much occipital pain and pain in back; definite rigidity of neck; tenderness of posterior muscles; abdominal reflex feeble both sides; knee-jerks present, but very difficult to obtain; plantar doubtful; Kernig's sign well marked.

Anæsthetic about fourteen hours after operation of 15th. Lumbar puncture: cerebro-spinal fluid much more turbid. Cells per cm., 2120; polymorphs, 90 per cent.; lymphocytes, 10 per cent.; plasma cells, *nil*; cultures, sterile; total protein not estimated; globulin increased; sugar diminished. Further operative procedure on right ear: trans-labyrinthine drainage of meninges. *17th December*: patient improved. As the cerebro-spinal fluid flow seemed to have ceased the patient was given an anæsthetic, and after carefully cleansing the cavity of the right ear, the drainage way was cleared. It seemed to have been blocked with clot. Lumbar puncture and cerebro-spinal fluid drawn off. Cells per cm., 900; polymorphs, 70 per cent.; lymphocytes, 25 per cent.; plasma cells, 5 per cent.; total protein, 0.08 per cent.; globulin increased; sugar diminished. No bacteria in films; cultures, sterile. Note rapid change in character of cerebro-spinal fluid in about fourteen hours after first operation with associated clinical changes. Also the change in cerebro-spinal fluid within forty-eight hours after the drainage of the meninges.

CASE III.—H. B., male, aged 19. Admitted 12th June 1919, in a collapsed state—moist skin, very pale, with small pulse. Mental condition seemed fair. Complained of mental confusion, severe giddiness, and headache. History from patient: deafness, slight in both ears since infancy; complete deafness, left ear, three days. Discharge: both ears since infancy. Earache: off and on in both ears since infancy; severe in left ear about four days. Tinnitus: machinery noise and whistling off and on since early life; not worse recently. Vertigo: slight for some months, but very bad for three days; falls to the left. Vomiting for two days. Headache, general. Had an operation done on each ear in early childhood. Right ear has the appearance of having had a radical mastoid operation. Granulations in the tympanic cavity and antrum regions. No tympanic membrane or ossicles to be seen. Left ear: offensive discharge; remains of malleus; sinus in posterior wall of meatus; marked tenderness over mastoid and slight periosteal thickening. Tuning forks: Weber to right voice response not recorded. Nystagmus: eyes to right, marked horizontal ear; Rinne, left, not heard by air conduction and by bone referred to right ear; and rotatory nystagmus; eyes to left, slight irregular nystagmoid movement. Rombergism: fell to the left, could not sit up straight. Caloric: hot water in left ear, no effect. Lumbar puncture: turbid fluid, not microscopically examined.

Operation: radical mastoid on left ear. Granulations and pus in the antrum. A sinus found extending towards the ampulla of the superior semi-circular canal; stapes not recognised. Superior and inferior

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labyrinthotomy, and translabyrinthine drainage of the meninges. Cerebro-spinal fluid came away freely. Day after operation: the cerebro-spinal fluid drained away freely and soaked the pillow in a short time. Patient much relieved. Pain and mental confusion gone. Rapid recovery.

*July 1920:* had a return of giddiness. Radical mastoid operation in right ear, granulation in the old cavity. Sinus extending toward ampulla of the right superior semicircular canal.

CASE IV.—G. E., male, aged 24. Admitted 8th April 1918. Had been discharged from the army for neurasthenia and otitis media, and was waiting in the hospital for "papers to go through." Seen in bed in badly lighted ward. Patient restless. Mental condition cloudy. History from patient; discharge from left ear, which he thinks began when in France, 1917, and continuous up to present time. Deafness: left ear for some years. Passed into the army in 1915, with slight deafness; thinks "stone deaf" in left ear since "blown up" in France, 1917. Earache: about two weeks in left ear. Never before, very severe at first. Vertigo: slight attacks for some months—attributed to neurasthenia. About ten days ago, whilst in bed, "felt something go" in the left ear, followed by severe vertigo. He now falls to left when he stands up. He has a general headache and confused feeling.

Left ear: periosteal thickening and tenderness over the mastoid, with purulent discharge. Right ear, *nil*. Tuning forks: Weber to right. No record of hearing of conversational voice. Slight rigidity of neck. Resents examination. Reflexes normal. Lumbar puncture: turbid cerebro-spinal fluid.

Operation: radical mastoid. Inferior labyrinthotomy and translabyrinthine drainage of the meninges. Free flow of cerebro-spinal fluid.

Patient left hospital in less than three weeks from time of operation, against orders. Wound not healed. Present condition: the walls of cavity are soundly healed—covered with epithelium, and a clean-cut depression can be seen where the inferior labyrinthotomy was made.

CASE V.—A. E., male, aged 35. Seen 9th November 1914, complaining of giddiness and discharge from the right ear. History: discharge from right ear since fourteen or fifteen years of age, off and on. Earache: severe in right ear when "under canvas" about a month or five weeks ago. Deafness in right ear slight for many years, worse when in camp, and much worse now. Vertigo: some giddiness four or five weeks; unsteady in walking, but never falls; worse last few days. Objects move left to right. Perforation of membrana flaccida and outer wall of attic on right side. Pus from perforation on exhaustion. Hearing: with Bárány noise apparatus in left ear, shouting not heard in right; Rinne—on right mastoid to left ear. Rombergism: falls to right. Refused to come into hospital.

Admitted as an urgent case, 11th December 1914: examined late at night. Patient looking very ill and complaining of mental confusion and occipital headache. Vomiting for two days. Nystagmus: fine irregular nystagmoid movements with eyes directed to left. Caloric test: cold water in right ear, no effect. Lumbar puncture: turbid fluid; complete examination of fluid not made.

Operation: radical mastoid, inferior labyrinthotomy, translabyrinthine drainage of meninges. Recovery.

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Case I. is unique. The symmetry of the pathological process is complete. There was chronic otorrhœa, fistula of the external semicircular canal and septic labyrinthitis in both ears, and septic meningitis from each ear in turn. He had translabyrinthine drainage on both occasions. He now has functional loss of both labyrinths. He can walk straight, with eyes open or shut, jump backwards or forwards, hop on right or left foot, bend forwards and laterally without falling. Standing in upright position he can localise an object after being turned in various directions with the eyes shut, as well as a normal man. He seems to be able to do most things an ordinary man can do. He also can follow a moving object with his eyes, his head being fixed, and keep his eyes fixed on an object whilst rotating his head in various planes—just as a normal man would do. After fast rotation many times, he can walk away straight as if nothing had been done to him. This effectually proves that the labyrinth has been destroyed. He is in the position of a normal person who is having simultaneously equal stimulus to both labyrinths.

Case II. indicates the importance of early diagnosis of meningitis. In fourteen hours a cell count in cerebro-spinal fluid was changed from 400 morpholymphocytes to 2120 cells, 90 per cent. polymorph. This case also shows that the sugar may not be diminished or possibly even increased in the early stages of meningitis. It serves also as a good example of the symmetry of pathological processes, namely: (*a*) chronic otorrhœa; (*b*) acute mastoiditis—with swelling on postero-superior wall of meatus; (*c*) cholesteatoma; (*d*) fistula of external semicircular canal in both ears.

Case III. demonstrates a sinus leading to ampulla of superior semicircular canal on both sides.

Dr A. A. GRAY (Chairman) said the series of cases was most important from the point of view of recovery from meningitis. Not long ago meningitis was looked upon as a hopeless condition, but the outlook was different now, for many cases recovered. The behaviour of a person with both labyrinths destroyed was interesting from the pathological and physiological standpoints. Had the patient been to sea since the operation, and if so, did he experience sea-sickness? It might bring to light further information as to whether the centre of disturbance, in sea-sickness, resided in the vestibular canals.

Mr TILLEY said this series of cases was the most valuable the Section had seen for many years. Would Mr Jenkins operate through the labyrinth in all cases of meningitis of otogenic origin as opposed to lumbar puncture in those which did not show organisms in the puncture fluid? He could recall certain cases in which the patients had been desperately ill with all the symptoms of acute meningitis, yet they had got well after lumbar puncture alone. He took it that they were not instances of septic meningitis, but were merely inflammatory. In other words, if there were



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no micro-organisms in the cerebro-spinal fluid, would Mr Jenkins consider the state of the case demanded the translabyrinthine route?

Mr J. F. O'MALLEY said that once having arrived at a diagnosis of meningitis, it had been the custom to regard the case as fatal. It was now possible to save early cases by dealing with them in the systematic way Mr Jenkins had adopted. Assuming that Mr Jenkins was able to make a diagnosis of purulent meningitis from examining the cerebro-spinal fluid, and that he could not be sure the infection had gone through the labyrinth, did he consider that the ideal method of treatment would be that carried out in these cases?

Mr W. STUART-LOW said that he understood it was at the early stage of meningitis, that was, at the stage when lumbar puncture generally gave some relief for a time, that Mr Jenkins operated. He (Mr Stuart-Low) had had two cases in which definite symptoms of meningitis had developed after operation. In his opinion it was reprehensible to syringe such cases, as likely to jeopardise the recovery of the patient: he therefore used a spray to remove the accumulated discharges. He found suction, however, of the greatest benefit and service. He had had small glass bell-shaped suckers made with rubber edges, and these he applied to the inner wall of the tympanic cavity, and used suction to draw septic discharges out of the labyrinth through the round and oval windows. After translabyrinthine drainage had been established by operation, he had found this method most effective and much better than trusting to drainage alone. He was certain that at least two of his patients who were going rapidly downhill after operation were rescued by this method.

Mr E. D. D. DAVIS said that this valuable series of cases clearly indicated when labyrinthotomy should be done. How did Mr Jenkins proceed after the removal of the promontory in performing inferior vestibulotomy?

Mr JENKINS (in reply) said that his work had followed upon the description of the operative procedure for labyrinthitis by West and Scott. The operation had been slightly modified. In answer to Mr Tilley, if a patient had a meningitis from infection through the labyrinth, *i.e.*, labyrinthitis and meningitis following it, it was imperative to open the internal auditory meatus, whatever else was done. The internal auditory meatus must be regarded as a pocket, and if the drainage was not thorough it would constitute a focus of infection. A certain number of cases were bound to get well following lumbar puncture if the meningitis was of the irritative type; but he knew of no way of ascertaining whether micro-organisms had got into the meninges or not. The lumbar puncture was a long way from the original site of infection, and few cells might be found in the cerebro-spinal fluid, and yet, in the internal meatus there might be a serious local infection. Therefore, if a patient had meningitis translabyrinthine in origin, drainage should in all cases be through the labyrinth; lumbar puncture could only be regarded as helpful, not curative; to rely upon it would be to lose patients' lives. His operative details did not differ much from those of West and Scott; he paid particular attention to a thorough cleaning up of all regions where pus was lurking. He advised superior and inferior labyrinthotomy. He syringed the whole

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region with iodised alcohol before he opened the internal auditory meatus. His object was to prevent any chance of secondary infection from organisms in the middle ear, which were present in all such cases. In two instances last year the patients seemed to be doing very well, and then the wound became septic; there seemed to be a re-infection of the meninges, and the patients died. In answer to Mr E. D. D. Davis he said that, having taken away a piece of the promontory, he went on with the straight chisel, keeping as low as possible in the internal meatus, and, having arrived there, he used a little rough instrument which cut outwardly as it was withdrawn, and the opening was enlarged downwards and backwards. He abstained from putting anything from the middle ear into the internal auditory meatus, *i.e.*, in the nature of a drain or wire: he put in nothing but a wick from the external auditory meatus to the opening in the promontory, and left it there. If the cavity was larger than usual he left the posterior wound open and used a gauze drain. He raised the legs of the patient and kept the head low, and the patient lay on the operated side. Two of the cases he washed through, one with eusol, the other with normal saline. Both patients seemed to be in a very desperate condition, but they recovered.

**Aural Exostosis — Second removed from the same Meatus Nine Years after First**—RICHARD LAKE, F.R.C.S., and A. J. WRIGHT, F.R.C.S.—Male, with large single exostosis removed from posterior wall of right external auditory meatus. Some ear discharge before removal. When T.M. was seen after operation, an anterior perforation was visible, ? pre- or post-operative. As the growth was large and deep, it was removed through post-auricular incision.

Three years later, anterior meatal wall swollen. In October 1920, aural discharge developed. On account of narrowed meatus, difficulty experienced in treatment, even with attic cannula, but meatus became dry. Patient showed marked mental depression.

*November 1920.*—Second growth removed through meatus: attached by broad base to floor of meatus. Uninterrupted recovery. Small marginal perforation noticed, which healed readily. One of us has seen a somewhat similar case of exostosis recurring after operation. In that case mental depression was also marked.

Dr W. HILL said there were very few cases of recrudescence of these obstructions. In one case he had had to operate three times: they were large hyperostoses, the aperture being nearly closed. The third removal seemed to have been successful. He operated post-aurally. He thought this case had been one of hyperostoses rather than of multiple exostosis.

Mr E. M. WOODMAN asked whether any members had had experience of destroying exostoses by the electric drill by the meatal route.

Mr TILLEY said Mr Field had effected removal with the electric drill, but in those which he had tried he was disappointed, on account of the granulations and the trouble in dressing them afterwards due to pain and occlusion of the meatus, which often occurred after the operation. He had

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long since employed the post-oral operation, which was simple and safe. He agreed that in some of these cases it was not merely an exostosis, but a hyperostosis of the meatal wall.

Mr A. J. HUTCHISON said he had been watching a case of this kind. There was an exostosis in both ears. Mr Cumberbatch had operated on one ear in 1892. The exostosis in that ear recurred to such a degree that it was impossible to tell which ear had been operated upon. No change whatever had occurred during the last fifteen years.

Mr H. J. BANKS DAVIS said the mere fact of the presence of an exostosis in the meatus did not mean that operation was required. In many cases where operation had not improved the hearing, the failure was due to the presence of exostosis inside the middle ear as well as outside.

Mr LAKE replied that he did not like the drill in these cases ; he used it only once. As a rule he did not turn the ear forward.

## **Otosclerosis, with a possible Bearing on the *Æ*tiology of the Disease**—RICHARD LAKE, F.R.C.S.

Attention was drawn to two special points in the following cases, namely : the incidence of the disease, and the effect of the removal of septic foci upon it.

Miss M. C., aged 24. First seen December 1917. Alleged deafness since the age of 12. Treatment by "Hectine" injections ampoule A, twice weekly.

Seen 14th June 1918: considerable improvement. Third visit, 30th August 1918. Fatigue period of ten seconds remarked. Next year, severe cold, became very deaf, and when seen on 31st January 1919, both promontories red. The tonsils were removed. The result was excellent, though unforeseen. Both fundi lost their red hue, and hearing improved to a marked extent.

Patient returned in June 1919: left fundus red, and despite treatment the hearing deteriorated. In May 1920 patient saw Dr Albert Gray, who agreed as to the diagnosis, and made valuable suggestions as to treatment. Still thinking that a septic nidus might be the source of the trouble, the left maxillary antrum was explored on 27th May 1920, and found full of pus. Disappearance of red reflex. January 1921: red reflex again on right side. Teeth examined by Mr Every-Brown, who discovered dental caries and caries of jaw, and X-ray examination showed disease around the sockets. Carious teeth and affected portion of jaw removed. No benefit.

Exhibitor would be grateful for any suggestions as to further treatment.

CASE II.—Woman, aged about 25, with recent history of rapidly increasing deafness; both ears showed red reflex. Tonsils removed without delay. Two weeks later, redness of fundi gone and hearing as good as ever.

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CASE III.—Lady, aged 30, described at the Twelfth International Congress as a case of otosclerosis, relieved by radium. Relief was not permanent, fundi again became red, and hearing deteriorated until January 1916. Various arsenical preparations seemed to keep the hearing stationary. Tonsils were removed 21st June 1921, and hearing improved up to time of writing. She can now carry on a certain amount of conversation without speaking tube.

Dr A. A. GRAY said he saw the patient in the first case about two years ago: she was very dull of hearing, and it was a typical case of otosclerosis. The case illustrated what he believed to be a general truth, namely, that when dealing with otosclerosis, all septic foci should be removed. That seemed to be the most which could be done for otosclerosis at present. The patient certainly improved after the operation, though her condition had become somewhat worse recently; but that might be because some infection was still occurring.

Mr STUART-LOW said he agreed with Dr Gray's remarks, and thought the improvement in hearing in cases of otosclerosis during a catarrh which might be due to the Eustachian tube becoming filled up with mucus from the nose and throat. Mr Lake's cases showed the importance of doing everything to improve the patient's general health, and justified one in trying to do all that was possible for those suffering from otosclerosis. Enucleation of the tonsils was, therefore, warrantable on the score of general health, but he was always very careful to take every precaution to avoid much hæmorrhage during the operation, as this might result in deafness being increased.

Dr DONELAN thought Mr Lake was to be congratulated on applying the principle of curing joint infections by removal of purulent foci as a means of improving otosclerosis. If Mr Lake was satisfied that the antrum of the lady was still a cause of offence, why was it not proposed to drain it thoroughly?

Mr LAKE (in reply) said that he brought the cases forward thinking they might constitute a stimulus to further work on the subject. In answer to Dr Gray, he did not know whether members had tried the effect of keeping the ear moist in post-suppurative cases with odourless paraffin; he had found that good results followed that treatment. In reply to Dr Donelan, he said that he had washed the antrum out once or twice since, but without finding evidence of infection.

**Exhibition of Pontimeter**—T. B. JOESON. (See *Journal of Laryngology*, 1922, p. 233.)

**Case of Acute Inflammation of the Middle Ear, with Empyema of Antrum in an Acellular Bone, with Dense Outer Antral Wall**—ARTHUR H. CHEATLE.—Middle-aged lady, with no history of previous ear trouble, first seen on 20th May 1920: deafness in and discharge from right ear. The week previously, while in bed with chill, had pain in right ear for four days, when it began to discharge and has continued to do so since. Pain ceased on rupture

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and had not recurred. On examination, slight purulent discharge; small perforation posterior superior segment of membrane. Hearing very deficient, conversational voice heard at 4 in., whisper at 1 in. The tuning fork on the nose referred to the affected ear. No labyrinthine symptoms or signs. No mastoid signs. The left ear, nose, pharynx, and nasopharynx normal. Temperature normal. No pain. Gentle syringing with boracic lotion ordered

4th June 1920: Still slight discharge with swelling of the membrane round small perforation, and marked deafness. Suspicion of œdema over the posterior superior deep meatal wall. No pain. Sleeping well. Temperature normal. No mastoid œdema or tenderness.

11th June 1920: Condition the same, but meatal œdema had increased. No mastoid signs, pain, or temperature. Operation in afternoon. Chiselling begun over antrum; after going through about  $\frac{1}{4}$  in. of dense bone, antrum opened, and thick pus welled up. Antrum thoroughly exposed so that walls could be examined and the cells lining the inner aspect of the outer wall removed. No mastoid cells were present. The wound was lightly packed and perfect hearing and healing resulted.

No bacteriological examination was made. The case is not a common one. Pain and headache were absent after the rupture of the membrane. The temperature was normal throughout. The discharge was scanty. There were no mastoid signs in the way of œdema or tenderness. The hearing was unusually diminished. Operation was undertaken because of the œdema in the deep meatus and the "hanging fire" of the case.

Dr DONELAN said he saw a case of acute otitis media with perforation two years ago. The patient had the usual treatment with drops, etc., for some months. He had continued well until he had sudden violent pain in and above the ear last week. There was no mastoid tenderness, but there was swelling of the inner end of the posterior wall. On this indication, a globular mastoid abscess of about 1 cm. diameter was evacuated after cutting through  $\frac{1}{8}$  in. of the densest bone. The site of operation was swabbed with ether, a half-inch rubber drain placed in the meatus and the mastoid incision sutured.

Mr TILLEY said it was exceptional for the temperature to be normal throughout a case of acute mastoid inflammation; possibly in Mr Cheate's case, absorption was prevented by the hardness of the bone. From the teaching standpoint, the most important sign in determining whether an operation on the mastoid should be performed was the swelling of the deep posterior meatal wall. It was almost pathognomonic of pus being retained under tension.

**Case of Localised Suppurative Meningitis over the Motor Cortex following Acute Mastoid Suppuration; Drainage; Recovery**—W. H. OGILVIE, M.S. (Introduced by Mr T. B.

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Layton, D.S.O., M.S.)—Girl, aged 12, admitted with a history of sudden pain in the left ear on 19th November 1921. Otorrhœa commenced on evening of 20th November: ceased on the following morning, but recommenced in the evening. Temperature  $101.4^{\circ}\text{F}$ ., pulse 128. Slight purulent discharge from left ear. No swelling, redness, or superficial tenderness over mastoid. Tenderness on firm pressure over mastoid antrum and tip of mastoid process.

Operation: Antrum contained granulations, but little pus. Mastoid process chiselled away down to dense bone surrounding lateral sinus. This bone was normal. Dura of middle fossa exposed; smooth, white, and pulsating. Infected cells and carious bone in tip and along anterior border of mastoid process. Cavity treated with B.I.P. and sewn up over glove drain. Temperature and pulse normal for thirty-six hours, then commenced to rise. 25th November, 10 P.M.: Temperature  $103.6^{\circ}\text{F}$ ., pulse 140; mental condition normal. 26th November, 10 A.M.: Temperature  $101.4^{\circ}\text{F}$ ., pulse 120; very drowsy; does not appear to grasp questions; eye reactions normal; knee-jerks and plantar reflexes normal; no motor paresis.

Wound opened. No further bone disease discovered. Dura of middle fossa further exposed, but found normal. Lumbar puncture: cerebro-spinal fluid under slight tension.

Examination of cerebro-spinal fluid; direct films showed lymphocytes and polymorphs in excess. No organisms. Slight reducing power; albumin, 0.03 per cent.

28th November: Drowsiness and inability to answer more marked. Obvious paresis right arm and hand, and right side of face. Reflexes: right abdominal diminished, Babinski on right side. Eyes react normally to light; no optic neuritis. Diagnosis: localised meningitis over the left motor cortex, involving the face and arm area.

Mastoid incision continued upwards. Temporal muscle split in line of fibres. Bone removed freely in upward and forward direction. Dura smooth, not bulging. When incised, subdural space and brain normal in appearance. More bone removed, and dura opened to the Sylvian fissure; appearance still normal. Exposure continued upwards by removal of bone and incision of dura, till a roughly circular patch of purulent meningitis, the size of a two-shilling piece, exposed, overlying the middle third of the pre-central convolution. A glove drain was placed leading from this area to the lower angle of the wound, which was then closed by suture of temporal muscle and skin, leaving the dura open.

28th to 30th November: Several Jacksonian fits, involving eyes, right face, and right arm. 30th November to 11th December: No more fits; development of hernia cerebri; rapid improvement in mental condition; gradual improvement in paresis of arm and face. 12th December: Right-sided sensory Jacksonian fit; involving arm, trunk, and

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leg, and lasting about ten minutes ; following this, marked astereognosis in right hand. Upper end of wound opened about 1 in., and a No. 8 rubber catheter pushed under dura in direction of arm and face sensory area in post-central convolution. Escape of a collection of clear cerebro-spinal fluid. Glove drain put along track, and four-hourly eusol dressings applied.

Improvement continuous. Arm and face paresis cleared up rapidly. Hernia cerebri had subsided in four weeks. Left hospital, 25th January 1922. Wound healed, quite well. Astereognosis had almost gone.

Dr SYMONDS said the diagnosis was an interesting problem. The girl had been ill only nine days, and when seen by him she had complete flaccid paralysis of the right arm, with fairly complete paralysis of the lower side of the face, some aphasia, and complete inability to put out her tongue to order. There was very little paralysis of the lower limb. The completeness of the paralysis of the upper limb, together with the fact that the motor functions of the lower limbs were practically intact, made it certain that there was a superficial lesion of the cortex, rather than a deep abscess ; indeed, nine days seemed scarcely long enough for abscess to develop. Lumbar puncture twenty-four hours previously revealed bacterial infection of the meninges, the excess of cells in the cerebro-spinal fluid consisting largely of polymorphs. The only reasonable conclusion seemed to be that there was a localised patch of meningitis over the motor cortex in the face-arm area. There had been no fits preceding the paralysis. The patient recovered very rapidly from the paralysis, the recovery being initiated by a series of Jacksonian fits, as if those fits represented the penultimate phase of the recovery. He had seen a similar occurrence once before, in a frontal affection, spreading from the frontal sinus. He would like to hear what was the method of spread from the mastoid to the meninges ; also as to the prospects of recovery if she had been treated by simple lumbar puncture without drainage. Bacteria were not cultivated from the cerebro-spinal fluid.

Dr A. A. GRAY (Chairman) said he had never seen a similar case : the spread from the mastoid was a most unusual one. There might possibly have been an abscess in the cells at the root of the zygoma ; it would be a more direct route than the passage from the mastoid antrum up to that region.

Dr WILLIAM HILL asked if the patient was shown as an instance of post-operative infection of meninges from exposing them at the operation, or whether it was assumed that the meningeal symptoms were there before the first operation.

Dr NORMAN PATTERSON said that recently he had had under his care a boy who, last November, had an ordinary cortical mastoid operation performed, after which he was sent to the convalescent home apparently recovered. Three weeks ago, however, he returned to the hospital with a temperature of 104° F., and looking very ill. The ear was soundly healed and there was no swelling over the mastoid. Vidal's test was negative, and the physicians could not find any cause for the temperature. A point of extreme tenderness was discovered, about the area of a sixpence, 2 inches behind the external auditory meatus. On opening the mastoid it was found

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to be quite normal. The sinus was pink in colour, and not apparently diseased. He followed the sinus backwards to a point opposite the tender area. Here he discovered a small abscess. The abscess was separated by a distance of at least 2 inches from the mastoid antrum. How had the infection spread there?

Mr RITCHIE RODGER said there was often extension through the bone at some little distance from the mastoid antrum, but how the infection spread in this case it was difficult to say. He had seen a case of the kind referred to by the Chairman. After operating for acute mastoid the patient was not doing satisfactorily, so he opened again, and found the zygomatic cells had escaped attention. Before he had reached to the end of the infective process he had gutted out  $\frac{3}{4}$  in. of zygoma. Later, there were symptoms of temporo-sphenoidal abscess, and in the bone removal he had to get to the region opposite to the middle of the zygoma before arriving at an area of discoloured dura which led into the abscess of the temporo-sphenoidal lobe. In the case of a child, six years old, an abscess had formed in the sinus, well above the mastoid process. The medical attendant had opened this abscess, which was treated as a discharging tuberculous abscess. The oculist later reported double optic neuritis, and the physician regarded it as a case of tuberculous tumour of the brain. There was a previous history of discharge for two days. He found the remains of a mastoiditis, which had resolved: there were a few tags of diseased mucosa in an enlarged antrum but nothing more; yet there was an erosion of the squamous portion of the temporal bone, and leading from that there was an abscess of the temporo-sphenoidal lobe, containing four ounces of pus. The child recovered, but was still blind. Infection could spread from the superficial cells in front of or behind the mastoid process, and so to more distant parts of the brain.

Mr COLLEDGE mentioned a case similar to Mr Ogilvie's, though his (Mr Colledge's) ended fatally. It was that of a man, aged 38, who had had otorrhœa all his life; he had been ill a week when he was sent to the hospital. On admission he had the classical symptoms of abscess of the temporal lobe; he was hemiplegic and aphasic. He had a cholesteatoma from which a track led to an abscess in the temporal lobe. It was successfully drained, but the patient developed a high temperature, evidently had meningitis, and died. At the necropsy an area of localised meningitis was found over the motor area of the size of a half-crown. He thought the two lesions masked one another, and the symptoms attributed to an abscess in the temporal lobe were due really to pressure from the meningitis over the motor area.

Mr OGILVIE replied that he paid particular attention to the zygoma, which was normal. The infection was round the anterior border of the lower half of the mastoid. At both operations the dura was normal. It seemed difficult to believe that infection had spread by the bone. Mr Jenkins had suggested to him that the infection might have been through the veins and diploë and through communicating veins, which sounded unlikely, as the flow of the blood stream was in the opposite direction; for this to occur, it would be necessary to have thrombosis, and then infection of the clot. The intervening bone was removed at the last operation, and it was healthy. He did not know whether the two infections could have been simultaneous, *i.e.*, infection of the mastoid and of the



## Ear

meninges from the blood stream. The localising symptoms in the brain did not appear until five days after the operation, and nine days after the onset of the ear symptoms.

**Case of Unilateral "Nerve Deafness" in Disseminated Sclerosis, with Immobility of Opposite Vocal Cord.**—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—G. W., aged 47, a subject of disseminated sclerosis, complains of deafness in the right ear which developed in 1916, and was preceded by "bilious attacks" with giddiness in 1915. Post-rotational nystagmus on both sides on 3rd February, well-marked, but the past-pointing defective. Galton whistle heard on the affected side at the mark 2.8 only, but on the normal side at 1 to 6. Bone conduction on the affected side very much diminished. Amongst other features are to be noted diplopia on looking down and complete immobility of the left vocal cord.

In a case resembling this (Hess, Dissertation, 1888, *Schwartz's Handbuch der Ohrenheilkunde*, p. 507), there was found to be complete destruction of the left median acoustic nucleus by a focus of sclerosis, while the same nucleus on the right side contained a considerable number of diseased ganglion cells. The left auditory nerve was sclerotic in a considerable part of its extent; the deafness in this case was on the left side. Moos is of the opinion that disturbance of hearing in disseminated sclerosis depends most probably upon a sclerotic degeneration of the auditory nucleus and nerve stem.

*Postscript.*—On 17th February 1922, patient was submitted to re-examination with the cold air test with the following results: on the *right* side, there was practically no nystagmus, giddiness, or past-pointing; on the *left*, cold air after forty-six seconds produced active nystagmus to the right, past-pointing (specially marked with left hand) to left, and falling to the left. The palate is symmetrically paretic. Left vocal cord still completely paralysed.

## ABSTRACTS

### EAR.

*Epithelioma of the Ear.* A. C. BRODERS. (*Surgical Clinics of North America*, Oct. 1921, p. 1401.)

In this study of 63 cases the epitheliomata are graded in four degrees of malignancy according to the tendency of the epithelial cells to differentiate. Seventy-six per cent. of the patients were males, 24 per cent. females, and 64 per cent. of the males were farmers.

## Abstracts

As regards site, 84 per cent. of the growths were on the auricle, 14 per cent. in the external auditory canal, and 2 per cent. in the middle ear. Fifty-six cases were operable and were treated surgically with or without radium application. Sixty-two per cent. were squamous-celled, 33 per cent. basal-celled, and 5 per cent. of melanotic types. Lymphatic glands were involved in 86 per cent. Results are classified according to the type, site, and size of growth and presence of metastases. Forty-seven per cent. of the patients are alive and well.

DOUGLAS GUTHRIE.

*Total Replacement of the Auricle.* J. F. S. ESSER. (*Münch. Med. Wochenschrift*, Nr. 36, Jahr. 68.)

In the first instance a rough model of the auricle to be replaced is fashioned from the patient's rib cartilage. This is inserted beneath the post-meatal skin. When from one to two months have elapsed and complete healing has ensued, the original skin incision is re-opened, but to a larger extent, and the soft parts including the periosteum elevated well forwards to the external meatus.

A cast of the wound cavity 2 to 3 mm. thick is now made by means of Stent's dental wax, the superfluous wax being cut away at the wound margin. When hard, the wax is removed and covered with a large Thiersch graft. The wax model so covered is now inserted into the wound and the edges sutured.

The stitches are removed in from eight to fourteen days and the Stent's model removed. It will be invariably found that the graft has healed in very accurate position and that the new auricle has now got an ample skin surface on both sides.

Minor plastic operations to form a lobule, etc., may be subsequently carried out without difficulty.

JAMES B. HORGAN.

*An Unusual Case of Injury to the Petrous Bone.* LAWSON WHALE. (*Lancet*, ii., 1921, p. 1002.)

The author gives the interesting history of an officer wounded at Loos in 1915 by a piece of shrapnel which passed through the right cheek (destroying the right eye), nasal cavities, and both maxillary antra, and lodged in the left petrous bone, where it caused no local symptoms until 1919, when the patient contracted influenza and resultant left otitis media with acute mastoiditis. Operation was necessarily extensive, the shrapnel being found in the concavity of the superior semi-circular canal. Recovery was slow but uncomplicated.

MACLEOD YEARSLEY.

*The Efficacy of Autogenous Vaccine Therapy in a Case of Septic Sinus Thrombosis.* P. CALICETI. (*Arch. Ital. di Otol.*, Vol. xxxii., No. 5, 1921.)

A male, aged 17, was admitted to the clinic on 4th February 1921, with acute middle-ear suppuration and mastoiditis. Operation 6th February 1921. Diffuse osteitis, sigmoid sinus exposed and covered with granulations. As it was soft and pulsating it was not opened. Pus showed diplococci of Fränkel. After operation the condition became noticeably worse; severe headache, tenderness under tip of mastoid; temperature rose to 40.9 with a slight rigor; no signs of inner ear or cerebellar disturbance. On the 8th, headache became acute and pain under mastoid spread down the course of the jugular vein: temperature rose to 40.2. On 9th February 1921, second operation: sinus widely exposed down to jugular bulb. It was yellowish grey in colour and did not pulsate. It was opened and found full of firm clot. Antero-external wall of sinus removed, attempts made to pull out clot; free bleeding from upper end, but none from lower end; jugular vein exposed in neck; found thrombosed; ligatured below thrombus but apparently not opened; dura of middle and posterior fossæ explored with negative result. For several days afterwards the condition was serious with high temperature. A vaccine was prepared from the pus. 13th February 1921, 10 millions given. Three days later temperature dropped somewhat to 36.4. On the same day a second injection of 10 millions was given. On the next day temperature remained below 39, but there was a slight rigor. On the 18th, rigor and temperature rose to 40.1. On 19th given 18 millions; patient complained of pain in right hip joint, which lasted several days. Temperature remained irregular for several days, and increasing doses of vaccine were given till they reached 250 millions on 4th March 1921. The general condition was now much improved.

After seventeen days without fever he had a rigor and temperature rose to 40.2, and after a profuse sweat dropped to 39. Next day (26th) complained of pain in right side of chest, and an area with harsh breath sounds was discovered. In the evening he had another rigor and temperature rose to 40.1. On 27th 100 millions of vaccine given, and three days later 200 millions. Temperature remained elevated for a few days, and then finally dropped. Patient discharged cured 8th April 1921.

Caliceti commenting upon the case points out the undoubted value of the vaccine. The septic character of the temperature continued in spite of the operation, and only dropped after the administration of the vaccines. Secondary septic foci had apparently started in the hip and lung, but had cleared up without any other treatment.

J. K. MILNE DICKIE.

## Abstracts

*Recent Work on the Labyrinthine Functions.* C. R. GRIFFITH, Ph.D.  
(*Journal of Ophthalmology, Otology, and Laryngology*, March 1922.)

The author, who is Professor of Psychology in the University of Illinois, states that the crude conception of nystagmus as a constant response to a vestibular stimulus is no longer regarded as sound. Nystagmus is something more than a simple reflex.

During the past two years he has rotated forty individuals at definite intervals in a chair fitted with various mechanical refinements, including an ultra-rapid moving picture camera and Dodge's apparatus, in which two small mirrors, resting upon the closed eyelids, reflect a beam of light in such a way as to magnify the ocular excursions, which occur more freely in the absence of visual fixation. Further, by attaching recording apparatus to the limbs, he has found that the whole body is just as definitely stimulated.

Griffith has also experimented with white rats, which lack the human faculty of fixation, but have a similar equilibratory mechanism. By means of special cages three successive generations have been bred in a constantly rotating environment. If the number of revolutions to the minute be changed frequently nystagmus tends to disappear; otherwise its duration is unaltered. Moreover, thus analysed, vestibular nystagmus is an undulatory movement rather than a rhythmic alternation of quick and slow components, and experiments with drugs having a selective action on the higher centres suggest that the cerebrum is not concerned. Griffith does not give details of these experiments. He regards nystagmus as a cerebellar and bodily adjustment running back in genetic history to the lateral line canals of the fish.

When the white rats are removed from the rotating cages they walk in the opposite direction to the previous rotation for three or four weeks, stopping only to eat or sleep, and unless returned to the cages die after a few months. When mated with normal rats the litters perish unless placed with a female in a revolving nest.

Griffith believes that the amount of turning a boy gets in his swing may permanently influence his labyrinthine functions. In a case of recurrent vertigo Griffith has commenced, in his laboratory, a course of treatment by cumulative rotations, hoping to establish a tolerance.

WM. OLIVER LODGE.

*The Psychological Absence of the Pointing Reaction.* BRUNO  
GRIESMANN. (*Münch. Med. Wochenschrift*, Nr. 7, Jahr. 69.)

The detailed description of a case, the first in the literature, in which a failure of the vestibular pointing and falling reactions could, with certainty, be ascribed to hysteria. This case clears up the pre-existing doubts about the possibility of such an occurrence.

# Ear

The psychological failure of the pointing reaction after rotation may be compared to the absence of reflex excitability in the functional anæsthesia which is met with in cases of hysteria.

JAMES B. HORGAN.

*An Acoustic Method for Training the Deaf.* Dr M. A. GOLDSTEIN.  
(*Laryngoscope*, Vol. xxxi., No. 7, p. 444.)

The author gives a historical survey of what has been done in this field and a classification of the various types and degrees of deafness. As regards prognosis each case must be considered as regards etiology, general physical and mental development.

The acoustic method of education requires great patience and persistence. In the case of a totally deaf child, the first step is to educate that child to hear a sound. This is done by means of the harmonium (Passive Education) which is specially made for the purpose. Gradually the notes of the harmonium are appreciated, and when perception of tones is sufficiently developed in range for the human voice, Active Education is commenced. The purpose of this is to educate the patient to hear at first simple vowel sounds. As soon as this is done the pitch is altered so that the same sound is heard at various pitches. Other vowels are taught, then consonants mixed with vowels follow. So far no word image has been produced by the method. This is now introduced by teaching a series of one-syllable words and educating the mind what the words imply. The association of ideas is as important here as in lip-reading.

Some of the results published are encouraging and the author hopes more interest will be taken by otologists in this question of educating the deaf. Much may be done for even the totally deaf. Obviously very intelligent teachers, with unlimited patience and perseverance, are necessary.

ANDREW CAMPBELL.

*The Effect of Methodic Acoustic Exercises on the Hearing Organ of Deaf-mutes.* Prof. URBANTSCHITSCH. (*Laryngoscope*, Vol. xxxi., No. 7, 477.)

In 1894, the author showed a number of pupils who had been trained by acoustic exercises with excellent results. A surprisingly high percentage of considerable residual hearing is present in deaf-mutes. The method adopted is similar to that of Dr Goldstein in St Louis.

The perception of hearing in deaf-mutes is subject to much fluctuation, but such is transitory, and good results are eventually possible. Acoustic fatigue may occur in the early periods of practice. Continued and concentrated attention is very tiring to the deaf pupil, and exercises should be given in small doses and repeated frequently.

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The pupil is at first only a little interested, but soon the desire to hear develops. Even the hearing of vowels is of great value, as this modifies the unpleasant, unmodulated voice of the deaf-mute.

ANDREW CAMPEELL.

*Anomalies in Patients who suffered from Epidemic Cerebro-spinal Meningitis.* A. DE KLEYN and C. VERSTEEGH. (*Acta Otolaryngologica*, Vol. iii., fasc. 3.)

Deafness remaining after cerebro-spinal meningitis may be divided into two main types: (*a*) slight inner-ear deafness characterised by diminution of hearing in the middle octaves, with complete or nearly complete integrity of the upper and lower regions and normal vestibular reactions. This type must probably be regarded as the result of a neuritis acustica; (*b*) various forms of inner-ear deafness of greater or less degree up to absolute deafness, combined with vestibular disturbances. Cases described in the literature belong usually to this type. Stenver's method of X-ray examination is of great use for detecting lesions of the inner ear. Many cases showed spontaneous nystagmus, the cause of which is probably a lesion of Deiter's nucleus.

Cases suffering from deafness of type (*a*) did not show vestibular disturbances, but on account of the inaccuracy of the methods of vestibular investigation as compared with the acoustic methods, it can never be safely concluded that the static sense in these cases is really normal.

Disturbances of equilibrium, such as are noted in type (*b*), may be due to lesions of either the vestibular apparatus or of the cerebellum or of both.

THOMAS GUTHRIE.

## NOSE AND ACCESSORY SINUSES.

*Rheumatoid Arthritis due to Infection of the Nasal Accessory Sinuses.*

P. WATSON-WILLIAMS. (*Brit. Med. Jour.*, 21st January 1922.)

The writer pleads that the recognition given to the teeth, the gastro-intestinal tract and the genito-urinary apparatus as possible sources of the auto-intoxication manifested in the rheumatic diathesis should be extended also to the nasal accessory sinuses.

He cites several cases in which the relationship was fully proved by complete disappearance of the symptoms on evacuating the pus from the affected cavity. He makes the observation that it is often found that the systemic effects—rheumatic and otherwise—are apparently more pronounced in cases where there is no profuse discharge of pus from the nose, just as it is often noticed that in children the systemic disturbance is not in due proportion to the size or apparent septicity

## Nose and Accessory Sinuses

of the tonsils and adenoids. His explanation of this is that where an infection gives rise to a profuse outpouring of polymorphonuclear cells with phagocytosis, the invading organisms are so largely inhibited or ingested that the patient is protected from septic absorption, whereas with few pus cells, toxic absorption is more pronounced. He compares in this respect the two forms of post-mortem wound—one with an acute local reaction, the other with almost no local signs, but a rapidly onsetting septicaemia.

T. RITCHIE RODGER.

*Nasal Diphtheria after Enucleation of the Tonsils.* B. SEYMOUR JONES, F.R.C.S. (*Brit. Med. Jour.*, 25th March 1922.)

The writer has seen five cases of nasal diphtheria in the past year, in all of which the tonsils had been previously enucleated. His suggestion is that, with the tonsils absent, the child is still liable to infection in the nose, and this site not being so obvious may readily escape notice, so that in his cases symptoms had been present for periods ranging from one month to three. He further thinks "there is ground for the presumption that nasal diphtheria may be a considerable factor in the causation of atrophic rhinitis, owing to its occurrence in children when the nose is growing, the turbinal bones in process of development, the arteries thin-walled, and the mucous glands immature. The diphtheritic toxins may act on the olfactory, sensory, and vaso-motor nerves of the mucous membrane, paralysing them, and consecutively inducing trophic changes by inhibiting the central impulses which govern growth."

T. RITCHIE RODGER.

*Caseous Empyema of the Maxillary Sinus.* Dr PAUL CAZEJUST. (*L'Oto-Rhino-Laryngologie Internationale*, September 1921.)

The author defines the condition as an affection of the maxillary sinus characterised by the accumulation in the sinus of a caseous material resembling the interior of certain sebaceous cysts, implicating or not the neighbouring structures, and with or without general or local symptoms. Only 33 cases have been published.

In the literature of the subject, two theories hold the field. On one side, Avellis and Luc think that this is not a separate disease but is merely a spontaneous cure of an acute sinusitis, resulting in the inspissation of the pus collected in the antrum, with a subsequent process of caseation taking place. These authorities state that cure of the condition has been known to take place after two lavages of the antrum. Texier, on the other hand, holds that this is a separate entity which may be of a mild type or may take the form of a very acute sinusitis, with much congestion of the affected side of the nose, and resembling malignant disease of the antrum or tertiary syphilis.

The writer's case was a man who complained of symptoms pointing

## Abstracts

to a very severe acute maxillary sinusitis. Lavage of the antrum affected was negative. The antrum was explored, and a mass of very foul-smelling cheesy material was removed from the cavity. After further lavage, the condition cleared up satisfactorily. The writer draws attention to the fact that this collection gathered in the eighteen days between the patient's first two visits.

In view of the obscurity of this type of sinusitis, Cazejust asks for research into the nature of the cheesy material found in these cases.

GAVIN YOUNG.

### LARYNX AND PERORAL ENDOSCOPY.

*The Danger of Steel Scrubbers.* ANDREW WYLIE. (*Lancet*, 1922, Vol. i., p. 626.)

The author describes four cases in which small pieces of wire, broken from steel brushes or steel scrubbers used by cooks to clean kitchen utensils, cause considerable trouble by lodging in the throat or larynx.

MACLEOD YEARSLEY.

*Hæmangioma of Larynx.* J. B. CAVENAGH. (*Lancet*, 1922, Vol. i., p. 635.)

The author describes the case of a man, aged 32, who complained of persistent hoarseness and cough. He was sent to a sanatorium as tuberculous. It was not until nearly five years later that a laryngoscope was used and revealed a pedunculated growth the size of a small bean over the anterior commissure.

MACLEOD YEARSLEY.

*Bronchoscopic Studies of Pulmonary Abscess.* HENRY T. LYNNAH, M.D., New York. (*Journ. Amer. Med. Assoc.*, Vol. lxxvii., No. 20, 12th November 1921.)

This paper deals with the treatment of lung abscess by suction through a bronchoscopic tube. The X-rays if used and interpreted by an expert makes the localisation of the infected lung comparatively easy. The dense zone around the abscess is described as a zone of pus sponge-soaked lung structure. After suction the outlines of the abscess cavity are much more clearly seen and most of the sponge-soaked area disappeared. Bismuth in pure olive oil was used as an injection into the cavity to better define its limitations.

Lynnah believes that most of the cases of pulmonary abscess in which persons survive are due to aspiration, and he feels that they should be treated as aspiration or foreign body pneumonia, and he gives a thorough bronchoscopic trial first before radical major surgical intervention is attempted. The only real contra-indication is severe pulmonary hæmorrhage; the temperature is of no account. Illustrative cases are cited.

PERRY GOLDSMITH.



# Reviews of Books

## MISCELLANEOUS.

*Acute Infection of the Thyroid Gland.* CHARLES REID EDWARDS, M.D.  
(*Journ. Amer. Med. Assoc.*, Vol. lxxvi., No. 10, 5th March 1921.)

This report deals with four cases of thyroiditis, that is, infection of the normal gland. The onset of the symptoms in these cases is usually sudden, accompanied by pain in the neck, frequently referred to the ear, teeth, shoulder, arm, or chest, depending on the amount of pressure produced. The temperature is elevated, pulse rapid, persistent cough with a pronounced change in the voice, dyspnoea, painful swallowing and extreme restlessness. The leucocyte count is usually increased unless there has been a profound infection of long duration. Physical examination revealed localised or diffused swelling in the anterior and lower part of the neck, with redness and marked induration, which sometimes makes it difficult to differentiate from woody phlegmon.

In the four cases cited suppuration was found in the gland in all. The recovery was uneventful, and the subsequent history of the cases showed no symptoms referable to an alteration in the thyroid secretions.

PERRY GOLDSMITH.

## REVIEWS OF BOOKS

*Traité de Pathologie Médicale et de Thérapeutique Appliquée: XXVI.*  
*Ophtalmologie et Otologie dans la Pratique Médicale.* SIEUR,  
POULARD, BAILLAIRT, and BOURGEOIS.

This is a well printed volume of 536 pages, in paper covers, with 134 illustrations. The inclusion of ophthalmology and otology in the same volume permits Sieur to write an excellent introductory chapter on the susceptibility of the eye and ear to systemic affections, in which various points of similarity are well brought out. For example, the ophthalmic and auditory nerves are affected by the same diseases, yet differences in the course of the respective affections are of much importance, as in estimating the prognosis of impaired function from loss of blood or toxic poisoning. A combined manual has also the advantage to the practitioner that many symptoms such as headache, vertigo or nystagmus may be ocular as well as aural in origin, just as paralysis of the external rectus associated with trifacial neuralgia (Gradenigo's syndrome) may be due to otitis media.

The ophthalmological section by Poulard and Baillairt well fulfils

## Reviews of Books

the purpose for which it has been written, and contains illustrations of external diseases of the eye of considerable artistic merit.

As one would expect from the pen of an otologist to the Laënnec Hospital, the section by Bourgeois includes a luminous account of the neurological aspect of diseases of the ear. The diagnosis and treatment of labyrinthine affections is carefully dealt with, even the rarer affections, such as alternating deafness and vertigo of vasomotor origin being discussed—"Mais Lermoyer a tracé de ce syndrome un tableau clinique si saisissant qu'il mérite désormais une description à part." In the diagnosis of hysteria (or pithiatism as Babinski prefers to call it) Bourgeois opines that persistence of the cochleo-palpebral and cochleo-phonatory reflexes is a surer sign than the presence of doubtful pharyngeal or tympanic anæsthesia. The illustrations in this section do not rise above the commonplace, though there is a good drawing of the operative exposure of the jugular bulb for thrombosis.

The manual will undoubtedly enhance the value of the system of medical pathology and therapeutics, of which it is the twenty-sixth volume—one to which the practitioner may refer with confidence that he will obtain sound and practical guidance in almost every contingency.

WM. OLIVER LODGE.

*Chirurgie des Maladies de l'Orcille, du Nez, du Pharynx, du Larynx.*

R. CLAOUE and A. VANDENBOSSCHE. Paris: A. Maloine & Fils, 1922. Fr. 25.

This book, the second edition of which is before me, is written in a clear didactic style which touches on the important points in diagnosis and treatment without entering into the discussion of alternative methods. The authors content themselves with describing the operative technique which in their hands has proved most satisfactory.

We note that apparently the only form of general anæsthetic employed in their various operations is chloroform. This is supplemented in some instances by local injections of novocain and adrenalin. The operation of laryngectomy is described in detail and many points of value in the operative technique are emphasised. The section dealing with tonsil surgery is small and hardly adequate to its practical importance. The subject is dismissed with a short description of the use of the galvanic snare, which they regard as the method of choice. Any portion of tonsil remaining is removed with punch forceps. While this method may be perfectly satisfactory in their hands it has been given up nearly everywhere else for many years, and the fact that none of the more modern methods are described constitutes a serious defect in the book. There are large sections

## General Notes

devoted to plastic surgery of the face and to the surgery of the thyroid gland which are not generally regarded as coming within the scope of the speciality.

One fault characteristic of Latin authors, whether French or Italian, which is evident in this book, is the indifference or carelessness about the spelling of proper names, such as Mac Even, Cheyne Stocke, William, Watson, Glasgow, Ingols, etc. However, the book is well illustrated with clear cuts, and the chapters dealing with nasal surgery are well written and concise, so that on the whole this book forms a distinctly useful addition to medical literature as a teaching manual.

J. K. MILNE DICKIE.

## GENERAL NOTES

### BRITISH MEDICAL ASSOCIATION, GLASGOW.

The Ninetieth Annual Meeting of the British Medical Association will be held under the Presidency of Sir William Macewen, F.R.S., from the 25th to the 29th July inclusive. The Sectional Meetings are arranged for the 26th, 27th, and 28th. Laryngology and Otology have been placed in the Single Day Sections.

The following Office-bearers have been elected :—

*Section of Laryngology*—*President*, Dr John M<sup>4</sup>Intyre, Glasgow. *Vice-Presidents*, Dr A. Brown-Kelly, Glasgow ; Sir St Clair Thomson, London. *Hon. Secretaries*, Dr Francis Frederick Muecke, 36 Cavendish Square, London, W. 1 ; Dr William Smith Syme, 11 Lynedoch Crescent, Glasgow.

*Section of Otology*—*President*, Dr A. A. Gray, Glasgow. *Vice-Presidents*, Dr J. G. Connal, Glasgow ; Dr W. F. Wilson, Newcastle-on-Tyne. *Hon. Secretaries*, Mr F. J. Cleminson, 32 Harley Street, London, W. 1 ; Mr J. W. Leitch, 6 Clairmont Gardens, Glasgow.

The Section of Otology will hold its Session on Wednesday, 26th. Discussion : Septic Sinus Thrombosis, its Diagnosis and Treatment, introduced by Sir William Milligan and Mr Lionel Colledge.

The Section of Laryngology will meet on Thursday, 27th. Discussion : Diseases of the Oesophagus, their Symptomatology and Differential Diagnosis, introduced by Mr W. G. Howarth and Dr D. R. Paterson.

On Friday, 28th, a Clinical Meeting of the Scottish Otological and Laryngological Society will be held in the Western Infirmary, to which all visitors are cordially invited.

With a view to facilitating the arrangements, social as well as scientific, Dr Syme will be glad if those who propose to attend the Meeting will intimate the fact as early as possible, stating, at the same time, if they propose to be accompanied by ladies.

# General Notes

## FRENCH CONGRESS OF OTO-RHINO-LARYNGOLOGY.

The Congress will be held on the 17th July at the Faculty of Medicine of Paris, under the Presidency of Dr Georges Laurens of Paris and the Vice-Presidency of Professor Jacques of Nancy.

The date of the Congress, usually held during the first fortnight of May, has been changed this year in response to the desire of many members who wished to see the Meeting coincide with that of the International Otological Congress.

The subjects arranged for discussion are :—

- I. The Classification of Chronic Deafness, introduced by Drs Escat and Rigaud.
- II. Vaccine Therapy in Otology, Rhinology, and Laryngology, introduced by Drs Baldenweck, Jacod, and Moulonguet.

All communications should be addressed to Dr Georges Liebault, The General Secretary, 216 Boulevard Saint-Germain, Paris (VII).

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## TENTH INTERNATIONAL OTOLOGICAL CONGRESS, PARIS, 19th to 22nd July 1922.

The Meetings will be held in the École de Médecine, under the Presidency of Dr Sebileau.

The following subjects for discussion (*Rapports*) have been arranged :—

- I. Abscess of the Cerebellum.
- II. Otitic Meningitis.
- III. The Value of Functional Tests of the Vestibular Apparatus.
- IV. Syphilis of the Ear.

The speakers will be :—MM. Buys, Gradenigo, Hennebert, Hinojar, Jenkins, Quix, and Schmiegelow.

During the Congress, a Supplementary Meeting will be devoted to the discussion of the following subject :—

“The Treatment of Cancer of the Larynx by Operation  
and by X-rays and Radium.”

The speakers will be :—MM. Chevalier-Jackson, Moure, Regaud, St Clair Thomson, Sebileau, and Tapia.

The subjects for discussion will be printed and distributed before the Congress meets.

The mornings will be occupied in visiting the Departments for treatment of Diseases of the Ear, Throat, and Nose, and for the surgery of the Head and Neck. (Operations, presentation of patients, etc.)

A collection of instruments and of anatomical and surgical specimens relating to diseases of the ear, nasal fossæ and nasopharynx, will be shown at the Faculty of Medicine during the Congress.

The subscription, which entitles members both to a copy of the *Rapports* and to the résumé of papers, is £2 sterling, and should be paid to the Treasurer, Dr George Laurens, 4 Avenue Hoche, Paris (VIII).

In order to facilitate arrangements, members are requested to state whether they intend to be accompanied by members of their family.

## General Notes

Tentative arrangements have been made at the Hôtel St James et d'Albany, 211 Rue St Honoré, for the accommodation of British Members of Congress.

Those who propose attending the Congress must make their own arrangements, both as regards their rooms at the hotel and their journey to and from Paris.

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The Congress of La Société Belge d'Otologie, de Rhinologie, et de Laryngologie will be held in Ghent in July 1922.

\* \* \*

### THIRD INTERNATIONAL CONGRESS OF HISTORY OF MEDICINE.

The Congress will be held in London from 17th July to 22nd July. The Sessions will be held at the Royal Society of Medicine, the Royal College of Physicians, the Royal College of Surgeons, the Wellcome Historical Museum and elsewhere.

There will be special exhibitions of objects connected with the history of medicine, surgery, and the allied sciences. The loan of any objects of special interest from members will be greatly appreciated by the Executive Committee.

Membership of the Congress can be secured by a subscription of £2, which should be sent to:—The General Secretary, Dr J. D. Rolleston, 21 Alexandra Mansions, King's Road, London, S.W. 3.

\* \* \*

*Sub-mucous Resection of the Nasal Septum.*—A critical study of this subject is being composed by Professor Mouret of Montpellier and his Chef de Clinique. They would be much obliged if every colleague who has written anything on the subject would send a reprint to Dr Paul Cazejust, Place du Palais 2, Montpellier, France.

\* \* \*

At the Forty-fourth Annual Congress of the American Laryngological Association held at Washington, D.C., 1st to 3rd May 1922, the following officers were elected for the ensuing year:—Dr George Fetterolf, Philadelphia, Pa; *Second Vice-President*, Dr Lorenzo B. Lockard, Denver, Colorado; *Secretary*, Dr George M. Coates, Philadelphia, Pa.; *Librarian*, Dr Joseph H. Bryan, Washington, D.C.; *Treasurer*, Dr J. Payson Clark, Boston, Mass.

\* \* \*

### "THE NEW YORK MEDICAL RECORD."

April 22nd marked the passing of the last of the old independent medical weeklies—the *Medical Record*. The final issue as a separate publication appeared on that date, and announcement was made that the *Medical Record* had been sold to, and combined with, the *New York Medical Journal*, which appears semi-monthly.

Throughout the fifty-six years of its service to the profession, the *Medical Record* has had the same publishers, and but two editors. Dr George F. Shrady guided its course for the first thirty-eight years and was succeeded by his assistant, Dr Thomas L. Stedman, who has long been

## General Notes

dean of American medical editors, and widely esteemed. The famous old firm of William Wood & Company will now devote its energies entirely to the publication of medical books, in which service it has been engaged for 118 years.

It is interesting to recall that many of the most important discoveries and developments in the progress of medicine were first announced to the American profession by the *Medical Record*. These include Lister's method of antiseptics; Koch's discovery of the tubercle bacillus and that of tuberculin; the employment of cocaine in eye surgery; the Roentgen rays; the discovery of the anti-toxin of tetanus and that of diphtheria; Madame Curie's discovery of radium, and many others.

\* \* \*

### BRETONNEAU.

It is only one hundred years ago that diphtheria was recognised as a specific disease. From the time of Hippocrates and Aretæus, it had been confused with Putrid Sore Throat or Angina Maligna.

It was after the lapse of two thousand years and in comparatively modern times that diphtheria forced itself upon the attention of physicians as a distinct disease. In the eighteenth century, Patrick Blair, John Starr, and Huxham of Plymouth advanced the study of what was often called "Croup," while Francis Home, Cheyne, and Cullen gave a description of "Cyanche Trachealis," which evidently corresponds to the diphtheria of modern times.

But it remained for the profession in France to complete the identification. "Croup," as it was called, was a more frequent and deadly visitor in France than in our islands. After it had caused the death of some of the members of the Imperial Family in 1807, a prize was offered by Napoleon I. for the best essay on the subject. This led to the publication of valuable works which preceded the classical memoirs of Bretonneau.

Bretonneau was a physician in the picturesque town of Tours, on the river Loire, and his work was founded on an alarming outbreak of the disease there in the latter part of the year 1818. The term *diphtheritis* was originally suggested by Bretonneau, who, observing that the disease was differentiated from other similar maladies by the formation of a false skin or membrane, coined the word *diphtherite*, from the Greek *διφθερέρα*, a skin or parchment, and *itis*, from *ἵσσις* (*ēsis*) (=hasty, impetuous), the well-known term used in medicine to imply inflammation.

Bretonneau paid this country the compliment of putting an English text on his frontispice with the words "Few men, even those of considerable capacity, distinguish accurately between opinion and fact (M. Moore)."

It is just one hundred years since this illustrious clinician affirmed the principles of the specific nature of diphtheria, and the event will be celebrated in the autumn in the town of Tours. There will be an exhibition of memorials and documents of Bretonneau and his pupils, and an excursion to the little village of Saint-Georges, on the river Cher, where a tablet will be fixed on Bretonneau's birthplace. A reception will be given at the beautiful Château of Chenonceaux by the chocolate millionaire, Monsieur Menier, and an excursion will be made to Chenon to visit the country of Rabelais, a still more celebrated medical man.

St C. T.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## THE SO-CALLED PROLAPSE OF THE LARYNGEAL VENTRICLE, AND EVERSION OF THE SACCULUS.

By IRWIN MOORE, M.B., C.M., Edin., Surgeon to the Hospital  
for Diseases of the Throat, Golden Square.

(Concluded from p. 353.)

### DISEASES AND MORBID CONDITIONS OF THE SACCULUS VENTRICULI LARYNGIS.

With the approval and kind co-operation of Professor Shattock I have endeavoured to tabulate these diseases or abnormalities as follows:—

1. Hydrops (unobserved).
2. Mucocele (unobserved).
3. Pyocele (unobserved).
4. Pneumatocele—

(a) Laryngoceles, *e.g.*, the cases of Bennett,<sup>80</sup> Parker,<sup>81</sup> Gruber,<sup>82</sup> etc.

(b) Hernia, *e.g.*, the cases of Solis Cohen,<sup>36</sup> Garel,<sup>11</sup> Frederick Spicer, etc.

5. Eversion of the Sacculus—

(a) Without eversion of the ventricle, *e.g.*, Moxon<sup>3</sup> and Morell Mackenzie's<sup>4</sup> cases.

(b) With eversion of the ventricle, suggested by cases recorded by Fletcher Ingals,<sup>65</sup> Koschier,<sup>9</sup> and Joseph Cohen<sup>70</sup> (Cologne).

6. Gland Cysts of the wall of the Sacculus (either with or without eversion). It is possible that the three cases last enumerated belong more properly to this group.

## Irwin Moore

7. Solid Tumours (unobserved). A tumour causing eversion of the ventricle, and secondarily eversion of the sacculus, appears to be the solution of one case recorded by Koschier<sup>9</sup> (see p. 346).

### PNEUMATOCELE.

A Pneumatocele of the Sacculus ventriculi differs from true eversion of the same structure in the fact that the part fills with air on phonation and does not recede into the ventricle.

Etymologically, the term Pneumatocele would be perhaps better than that of "Aërocele," recently used by Dundas-Grant<sup>77</sup> in a discussion on the case exhibited by Frederick Spicer (see p. 387), were it thought desirable to indicate the fact that the sac contains air and not fluid. Pneumatocèles, if extending beyond the confines of the larynx, usually appear externally in the neck between the thyroid cartilage and the hyoid bone. For clinical purposes they may be subdivided into Laryngocèles and Hernias.

#### (a) Laryngocèles.

The term "Laryngocele" used by Frederick Spicer<sup>1</sup> was introduced, in 1867, by Virchow<sup>83</sup> to describe those cases of thin-walled air-sacs which arise in connection with the laryngeal ventricle. He says: "I have found a dilatation of the ventricle of Morgagni, up to the present unknown as it seems, which one may call 'ventricular laryngocele.' One sees, in these cases, small elongated sacs with thin walls, coming off from the upper part of the ventricles by a somewhat narrow orifice, and sometimes reaching to the upper border of the thyroid cartilage, and even to the hyoid bone, where they terminate by an end in the form of a club; most frequently they are found only on one side; once, however, I have met them on both sides. Their walls are smooth, their interior is lined with ciliated epithelium, and they are filled with air."

Hansberg<sup>84</sup> (Dortmund), in 1913, stated that only 24 cases had been published to date.

They are congenital and only become apparent on increased expiratory pressure such as coughing, the air being pressed into the sacculus.

Pelletier<sup>85</sup> (Paris), in his Thesis on Laryngocèles (1900), divides these air-sacs into two groups or types, the first the "laryngocele ventriculaire" of Virchow, the tumour being always intra-laryngeal, and the second corresponding to cases such



## \* Prolapse of the Laryngeal Ventricle

as those recorded by Bennett and Gruber, etc., in which one portion of the tumour is intra-laryngeal, and the other extra-laryngeal. This division, however, serves no specially useful purpose.

### *Some Recorded Cases of Laryngoceles.*

Bennett<sup>80</sup> (Dublin), in 1865, exhibited at a meeting of the Dublin Pathological Society, a specimen of a human larynx in which bilateral laryngeal pouches, such as are found in the *Quadrupana*, were abnormally developed in a male, aged 24. The condition was accidentally discovered in the dissecting-room, and the specimen is preserved in the Anatomical Museum of Trinity College, Dublin. The sacs, which appeared above the border of the thyroid cartilage, occupied nearly the entire lateral surface of the thyro-hyoid membrane, and extended upwards and outwards as far as the lateral thyro-hyoid ligament, and were in contact with the greater cornu of the hyoid bone. The membrane forming the sac was very thin, and very loosely connected to the parts around.

Gruber<sup>82</sup> (St Petersburg), in 1874, referred to two specimens in the Museum at Munich, in which the formation of this type of air-sac occurred in man. He recorded one case in 1874, in which there were extra-laryngeal ventricular sacs on both sides; and a second case in 1876, in which the left sac lay partially outside the larynx on its lateral aspect, whilst the right sac, though rising to the height of the hyoid bone, remained intra-laryngeal; a third case in 1879, in which the abnormality was symmetrical; and a fourth case also in 1879, in which there was an extra-laryngeal sac on the right side (Fig. 19).

Broësicke<sup>86</sup> (Berlin) has seen a median pouch perforating the thyroid in the region of the vocal cords.

R. W. Parker,<sup>81</sup> in 1886, recorded a case in which the sacculus in a child of two months had formed an emphysematous swelling in the posterior triangle, the size of a tangerine orange.

Cunningham,<sup>23</sup> in 1902, illustrated in his *Text-Book on Anatomy* a specimen (Fig. 688, p. 917), showing a great extension of the sacculus outside the larynx.

Rickman Godlee and Bucknall,<sup>87</sup> in 1901, recorded a case which they described as a "Pharyngeal Pouch" of large size, removed by operation. Patient, a male, aged 31, had received a blow (twelve years previously) on the left side of the neck, followed two years later by a feeling as if something was working up and down the neck on deglutition, but not always present. During the previous three years he had suffered from acute attacks of this swelling, lasting two weeks or more at a time, causing difficulty in swallowing anything but liquids, following which it would gradually or suddenly disappear. At this time, squeezing the tumour would give rise to expectoration of phlegm.

## Irwin Moore

After the last attack the tumour became much larger. When first seen in May 1900, the tumour looked like an enlarged thyroid on the left side of the neck at the level of the hyoid bone, and in front of the sterno-mastoid. It was soft and tympanitic on percussion, freely movable over the deeper parts, except at the top of the larynx to which it was fixed, and the movements of which it followed during deglutition. Pressure caused diminution in size. It was diagnosed as a "pharyngeal or possibly an œsophageal pouch." When seen six months later after the last acute attack, the tumour had reached the middle line of the neck, and extended to the posterior border of the sterno-mastoid muscle up to the angle of the jaw and down to the clavicle. It was evidently a thin-walled cyst. Not only did it give a tympanitic note on percussion, but on holding the breath and blowing, the patient could slightly inflate the tumour, producing a change in the percussion note. Laryngoscopic examination showed the larynx to be normal and both cords freely mobile. On operation the tumour was found to be covered by thin skin, difficult to separate by dissection, and consisting of two portions communicating by a rather small opening. The pedicle, which was secured and ligatured outside the larynx, passed through the thyro-hyoid membrane, and careful probing failed to discover an actual communication with the pharynx.

Examination of the pouch showed that it consisted of fibrous tissue without muscular elements, with its inner lining membrane thrown into folds in the larger sac like a hypertrophied bladder, and smooth in the smaller portion. The epithelium in its superficial layer was ciliated, and in its deeper layer columnar or cubical; deeper, there were several nodules of lymphoid tissue, and at one spot a group of acini cut across, resembling mucous salivary glands. A few ducts were also visible. The authors remark that this pouch was obviously of the pharyngeal variety. (At the time this case was published, Keith expressed the opinion that it was an enlarged air-sac.)

Henle<sup>88</sup> (Breslau), in 1904, operated on an elderly man, who for ten years suffered from an aërial tumour situated on the right side and which had gradually developed. The tumour extended upwards, under, and beyond the angle of the jaw, and downwards close to the clavicle. On removal patient was cured. Its connection with the larynx was shown to exist by a canal between the thyroid cartilage and the hyoid, *i.e.*, through the thyro-hyoid membrane.

These cases represent reversions to the condition present in the ape. They are generally unilateral, but may occur on both sides. It was to such cases as these that Virchow gave the name of "Ventricular Laryngocele."

# Prolapse of the Laryngeal Ventricle

## (b) *Hernia of the Sacculus Laryngis.*

The term "Hernia" of the Sacculus Laryngis, it may be suggested, might be applied to those cases where the inflation leads, in the first stage at least, to an inward protrusion of the upper wall of the sacculus at the weak spot between the lower margin of the muscular sheet of the aryteno-epiglottideus inferior muscle and the ventricular band (see Hilton's dissection, Fig. 3). The protrusion in the case of the hernia, though it may eventually involve the whole sacculus, with the exception of the lowest and outer part, takes place directly towards the air way, or horizontally, and is distinctly of a pathological kind; in the case of laryngoceles the extension is upwards, and falls into the group of morphological reversions.

### *Some Recorded Cases of Hernia of the Sacculus.*

Solis-Cohen<sup>36</sup> (Philadelphia), in 1887, recorded a case which he described as "Phonatory Pneumatic Distension, or Hernia of the Laryngeal Sac," following a stenosis of the larynx due to cicatricial adhesions and cured by gradual dilatation. During a considerable portion of the period of stenosis it was observed that phonation took place by the ventricular bands only. After the stenosis had been relieved by dilatation it was noticed that during phonation the vocal cords became approximated naturally; next, if the phonatory effort was continued, the ventricular bands were forced together in close apposition, after which, and following relaxation, the "sacs of Hilton" suddenly bulged forward with an audible jerk into the interior of the larynx as if "shot out of an air-gun." The left sac looked like a small globular tumour, the size of a small cherry, of paler appearance than the rest of the larynx owing to distension of the mucous membrane.

[Shattock considers that there is a marked similarity between this case and that recorded by Frederick Spicer<sup>1</sup> (see description later), and that the explanation is probably the same; for example, in the case under consideration, the pressure of air beneath the abnormally closed and phonating ventricular bands led first to inflation of the sacculus (the air filling the sac from its mouth); next, as the pressure increased, a mesial protrusion from the unsupported part of the inner wall took place, which herniated with an audible jerk, through the weak triangular area between the lower fibres of the inferior aryteno-epiglottideus and the ventricular band (see Hilton's dissection, Fig. 3). The author does not say that the tumour came out of the ventricle of Morgagni.]

Ledderhose<sup>39</sup> (Strasburg), in 1889, recorded a case in which a tumour with a broad base extended from the internal wall of the

larynx into the laryngeal cavity. In consequence of cyanosis, thyro-fissure was performed and the tumour (which he called an aërial cyst) was removed. It was situated intra-laryngeally and was caused by a protrusion of the upper end of the sacculus into the laryngeal cavity.

Benda and Borchert<sup>90</sup> (Berlin), in 1897, reported the case of a maniac who died of asphyxiation in consequence of an aërial tumour becoming fixed between the vocal cords.

Garel<sup>11</sup> (Lyons) exhibited before the Société des Sciences Médicales de Lyon, 20th January 1904, a male, aged 36, who had suffered for fifteen years from "alteration in the voice," during the latter ten years being almost completely aphonic. On examination of the larynx two distinct tumours were observed. A large polypus attached to the margin of the right vocal cord, which on phonation was forced upwards between the ventricular bands, and a second tumour, bi-lobed, transparent and pale-looking, which suddenly appeared in the cavity of the larynx as if shot out by a spring. The latter tumour protruded from the superior surface of the right ventricular band in the part adjoining the ary-epiglottic fold. On the left side a similar slight protrusion occurred in the corresponding position. Garel stated that this was the first occasion that he had come across a similar condition, and suggested that since the tumour collapsed and disappeared during inspiration, there was only one explanation. When phonation was attempted, the polypus, by occupying the space between the ventricular bands, interfered with the free expiration of air, with the result that the ventricular walls had to bear the strain of the intra-thoracic pressure, giving rise by degrees—after a considerable time—to a hernia. He presupposes that the polypus had existed for fifteen years and had given rise by slow stages to the condition above described. Following removal of the polypus the "ventricular hernia" never recurred. [This case is undoubtedly similar to those recorded by Solis-Cohen<sup>56</sup> (previously described), and Frederick Spicer<sup>1</sup> (described later).]

Kan<sup>91</sup> (Leiden), in 1908, observed congenital air-sacs in an infant sixteen days old, which caused sudden death from asphyxia.

Frederick Spicer,<sup>1</sup> in 1920, exhibited at a meeting of the Section of Laryngology, Royal Society of Medicine (3rd December), a case which he described as a "Laryngocele." Patient, a male, aged 68, one night after getting wet, was seized with a severe attack of croup accompanied by violent coughing, followed by hoarseness which had persisted without any change for twenty years. Examination of the larynx showed—on quiet respiration—the left vocal cord covered in its anterior fourth, by a fold of mucous membrane. On phonation a smooth globular tumour appeared looking like a distended sac of mucous membrane filled with air (Fig. 20). It started to fill from the anterior part of the ventricle, covered the opposite cord, and occluded

## Prolapse of the Laryngeal Ventricle

the air-way. The patient's doctor reported that "the larynx as seen to-day is the same as it was twenty years ago." This case gave rise to much interest and discussion. Opinions were somewhat divided as to whether the tumour protruded from the ventricle between the true vocal cord and ventricular band, or from above the ventricular band.

William Hill<sup>92</sup> regarded it as a diverticulum (air-sac) from the ventricle of the larynx, similar to those found in the lower animals, and suggested trauma as a cause, since the condition followed immediately on a fit of coughing. He thought the patient might have a large ventricle which had become inflated and caused the sac. This view was supported by Banks-Davis,<sup>93</sup> and Layton,<sup>94</sup> who also regarded it as an air-sac; whilst others suggested a cyst, or a soft fibroma which had undergone cystic degeneration. The present writer<sup>95</sup> thought that the tumour represented the everted sacculus laryngis.

Frederick Spicer<sup>1</sup> later (4th February) reported that he had punched out a piece of the tumour and found that it contained air, and that its wall immediately collapsed. William Hill,<sup>92</sup> referring again in discussion to this case, regarded the tumour as an enormously dilated sacculus, which had herniated through the fibres of the anterior third of the right ventricular band (Fig. 3) and became inflated on coughing or forced expiration, followed on quiet respiration by collapse, when it could be seen crumpled up on the ventricular band.

Dundas-Grant<sup>7</sup> considered that the tumour was an "aërocele," and due to traumatic rupture of the sub-cordal mucous membrane, probably caused by forcible vocal effort, followed by air being driven into the submucous tissue of the vocal cord and ventricular band. Later (7th May), he demonstrated at a meeting of the same section, a post-mortem specimen of a larynx, which he had prepared, showing how an artificial "emphysema" of the right half of the larynx could be produced by the forcing of air under the mucosa of the subglottic space, by puncturing the sub-cordal mucous membrane with a needle attached to a syringe. This cannot satisfactorily explain the condition in the case under discussion, which had persisted without change for twenty years.

[Further consideration of Frederick Spicer's<sup>1</sup> case shows that it is peculiar, in the fact that—on complete phonation—the tumour became inflated, and that it was observed to fill from its anterior extremity, which establishes the fact that the opening into the sac remains patent—whence only two explanations are possible: first, that a retroflexion of the sacculus laryngis had occurred, followed by its eversion into the interior of the larynx along with the ventricular wall—the sac consisting of the wall, not only of the sacculus but also of the ventricle—or that the sacculus laryngis had protruded into the larynx above the ventricular band.

# Irwin Moore

William Hill's<sup>92</sup> suggestion of the possibility of a hernia of the sacculus through the ventricular band is strengthened, if not confirmed, by the examination of one of Hilton's dissections (Fig. 3), which shows the presence of a weak triangular area between the lower fibres of the aryteno-epiglottideus inferior muscle and the ventricular band, through which the distended sacculus, covered with the laryngeal mucosa, might herniate, as in the formation of pharyngeal pouches at the site of election in the middle line at the lower part of the pharynx (see Fig. 3). Through the courtesy of Dr Frederick Spicer<sup>1</sup> the writer has recently (January 1921) re-examined the patient, and has come to the conclusion that this is the correct diagnosis of the case.]

## EVERSION OF THE SACCULUS WITHOUT EVERSION OF THE VENTRICLE.

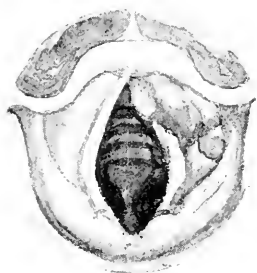
Walter Moxon<sup>3</sup> (Guy's Hospital), in 1868, was the first to study and record this condition. The "tumour" was unexpectedly observed at the autopsy of a male patient, who died of cancer of the stomach. No laryngeal symptoms were present during life. The larynx was exhibited at a meeting of the Pathological Society of London, and is now in the Museum of Guy's Hospital, No. 1863, re-numbered 2. It showed a small pendulous "tumour," hemi-elliptical in shape, which protruded from the anterior half of the ventricle, and hung down over the vocal cord (Fig. 21). Moxon stated that it could be easily put back into the usual position of the sacculus of the larynx, *i.e.*, it could be inverted and returned behind the false cord. When replaced it very easily fell out of its position and again reappeared. On these grounds he regarded it as the everted sacculus laryngis. Arthur Durham,<sup>96</sup> in 1883, referred to this case as "Extroversion" of the mucous membrane of the left "ventricle" of the larynx, simulating laryngeal polypus.

Through the courtesy of Mr Davies-Colley, the Curator of Guy's Hospital Museum, permission was recently obtained by the writer to re-examine this specimen. On removing a portion of the left thyroid ala Prof. Shattock found the sacculus was absent from its normal position—which proves that Moxon was correct; and although half a century has elapsed since this specimen was mounted, the everted sacculus could be easily replaced into its normal position, and again everted into the position which it now occupies.

Morell Mackenzie,<sup>4</sup> in 1871, recorded the second specimen,



FIG. 19.—Larynx showing right Sacculus Ventriculi lying partially outside on the thyro-hyoid membrane. (Gruber.)



On quiet respiration



On phonation

FIG. 20.—Hernia of the left Sacculus Laryngis.  
(Frederick Spicer's Case.)

Illustration reproduced from the *Proc. Roy. Soc. Med.*, by kind permission.

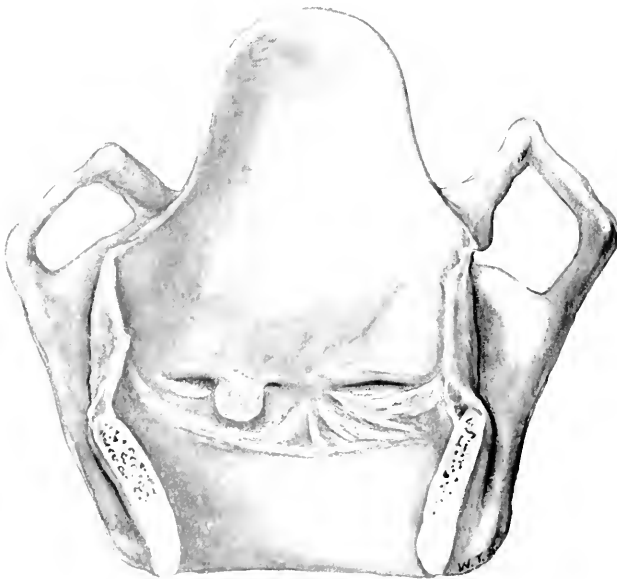


FIG. 21.—Eversion of the left Sacculus Laryngis.  
(Moxon's Case.)

Specimen No. 1863, re-numbered No. 2, from the Museum of Guy's Hospital.



FIG. 22.—Eversion of the left Sacculus Laryngis : Partial Eversion of the right Sacculus Laryngis. (Morell Mackenzie's Case.)

Specimen No. 20 from the Museum of the Hospital for Diseases of the Throat, Golden Square.



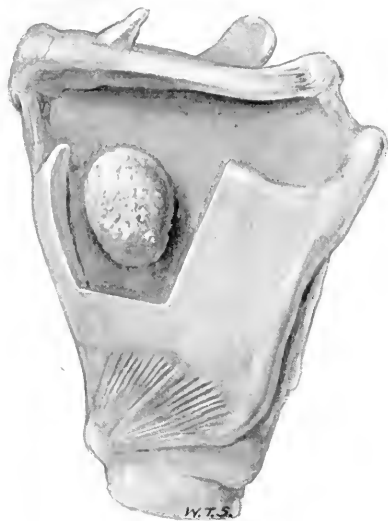


FIG. 23.—The same specimen with the everted Sacculus Laryngis, replaced into its normal position, and lightly distended with cotton wool. (Morell Mackenzie's Case.)

Specimen No. 20 from the Museum of the Hospital for Diseases of the Throat, Golden Square.  
(Re-dissected by Prof. S. G. Shattock, F.R.S.)



FIG. 25.—Coronal Section of Ventricle and Sacculus (see specimen, Fig. 24), showing Hyperplastic Tuberculosis and formation of folds, simulating Prolapse. Interior of larynx is site of tubercular disease of similar hyperplastic character. Section by Prof. Shattock of a specimen in Museum of Golden Square Hospital, prepared to illustrate Dr Irwin Moore's paper on "Eversion of the Laryngeal Ventricles, so-called Prolapse, including Eversion of the Sacculus."

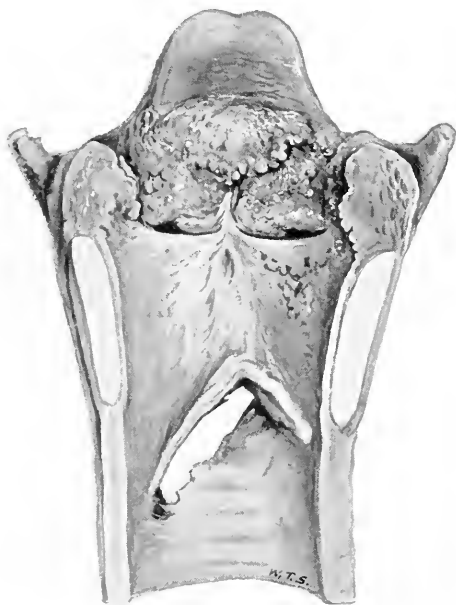


FIG. 24.—Larynx showing Hyperplastic Tuberculosis simulating Prolapse of the Sacculus Ventriculi.

Specimen No. 35, from the Museum of the Hospital for Diseases of the Throat, Golden Square.



## Prolapse of the Laryngeal Ventricle

No. 20,\* now in the Museum of Golden Square Hospital. It was unexpectedly observed after death in a male patient, who had been admitted to the hospital one evening suffering from tuberculosis of the lungs and larynx, and who died the next morning. No notes could be taken, and there is no record as to the state of his voice. Morell Mackenzie stated that the left ventricle of Morgagni was entirely everted, and that the right sacculus protruded slightly from the ventricular orifice. It is evident that Morell Mackenzie employed the term ventricle and sacculus as synonymous with each other, for he referred to having resected a portion of the left thyroid ala from without, and not only found that the sacculus laryngis was absent from that side, but that the protruded sac could be inverted and replaced in its normal position, presenting the well-known appearance of a Phrygian cap. A recent examination of this specimen by Professor Shattock shows that the tongue-like protrusion occupies the anterior third only of the ventricle of Morgagni (Fig. 22); that there is no eversion of the proper ventricle; and that the everted sacculus could be readily replaced into its normal position (Fig. 23), and again everted into the larynx. There is a similar but less pronounced eversion of the sacculus of the opposite side (see Fig. 22). The mucous membrane of the larynx in this specimen is the seat of tubercular ulceration, most marked on the ventricular bands and cushion of the epiglottis. There were tubercular cavities in the lungs.

Morell Mackenzie,<sup>4</sup> in referring to Moxon's<sup>3</sup> case, says: "There is every reason to believe that the 'prolapse' took place *in articulo mortis*," and he suggests the same possibility in his own case, but he gives no reason for justifying such a conclusion. Lefferts,<sup>2</sup> in 1876, referring to Moxon's<sup>3</sup> and Morell Mackenzie's<sup>4</sup> cases, takes the same view on the grounds that "there were no symptoms during life indicating so serious a lesion"—an opinion formed without an inspection of Moxon's specimen, in which the projection is so small and thin that the absence of symptoms referred to in the notes of the case is quite explicable. In Moxon's<sup>3</sup> specimen of true eversion of the sacculus, recently confirmed, the mucous membrane covering the upper part of the tumour merges into that of the upper surface of the ventricular band. The explanation of this

\* Museum Catalogue, Hospital for Diseases of the Throat, Golden Square, p. 15.

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is that in addition to eversion of the sacculus there is—as Shattock points out—some dragging on the roof of the ventricle between the mouth of the sacculus and the free border of the ventricular band—an indication that the eversion occurred during life, and not *in articulo mortis*, as suggested by Morell Mackenzie.<sup>4</sup>

Koschier,<sup>9</sup> in 1879, in his paper on “Prolapse of the Sinus of Morgagni,” employs the term “eversion of the ventricle” as synonymous with eversion of the sacculus, and discusses the different processes which may give rise to it. He refers to Moxon<sup>3</sup> and Morell Mackenzie<sup>4</sup> as having regarded their cases as real eversions of the mucous membrane. He contends that prolapse is never represented by a simple eversion of the mucous membrane, as, he says, Morell Mackenzie “had imagined.” He mentions the investigation undertaken by Lefferts,<sup>2</sup> which showed that in these particular cases a chronic inflammation of the mucous membrane of the ventricle with hypertrophy of the sub-epithelial connective tissue explained the formation of such tumours.

Möller, in 1905, referred to these two cases under the title of “Prolapse or Eversion of the Ventricle.” He misuses the term prolapse as synonymous with eversion, and the ventricle as synonymous with the sacculus, and expresses the opinion that these were not real cases of prolapse of the ventricle, but due to cedematous hyperplasia of the ventricle. He refers to Fränkel’s<sup>8</sup> doubts whether the walls of a cavity like the ventricle of Morgagni, and especially of its appendix, can evert.

Morell Mackenzie’s<sup>4</sup> specimen was exhibited at the International Congress, London, 1913, as an example of “prolapse of the ventricle.” This specimen, as also that recorded by Moxon, were demonstrated by the writer<sup>95</sup> at a meeting of the Section of Laryngology, Royal Society of Medicine, on 4th February 1921, and proved to be genuine cases of eversion of the laryngeal sacculus.

All the authors cited, almost without exception, appear to be unaware of the pathology of Moxon’s<sup>3</sup> and Morell Mackenzie’s<sup>4</sup> specimens, and having seen no true case of eversion themselves, have either endeavoured to explain away the existence of these, or to include them in the other group into which their own cases fall, viz., inflammatory hyperplasia.

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Uckermann<sup>79</sup> (Christiania), in 1914, showed a small irregular tumour the size of a pea, proceeding from the right ventricle of Morgagni, in a man, aged 18. It was removed by means of forceps, and on microscopical examination was found to consist of mucous glands embedded in loose connective and fatty tissues, as well as round cells, that is to say, hyperplasia of the mucous membrane coupled with inflammation, or, as it was formerly designated, "eversio ventriculi Morgagni." [Professor Shattock considers that there is definite microscopical evidence to show that this was a case of eversion of the sacculus.]

## *Spurious Eversion of the Sacculus arising from Hyperplastic Tuberculosis of the Mucosa.*

Tuberculosis undoubtedly, as has been shown, leads to spurious forms of eversion (see p. 349). An excellent demonstration of this condition is afforded by a specimen, No. 35 in the Museum of Golden Square Hospital (see Fig. 24).<sup>\*</sup> Through the courtesy of Mr Jefferson Faulder,<sup>97</sup> Curator of the Museum, who recently in discussion referred to it as "Prolapse of the Ventricle," an opportunity was offered for re-examination of the specimen. This has been thoroughly investigated by Professor Shattock, who has made a section through the sacculus and supplied the following particulars:—

"*Macroscopic Description of a Specimen of Pseudo-prolapse of the Ventricle of the Larynx.*—A larynx opened from the back, of which the left half has been vertically divided through the ventricle and sacculus (Fig. 24). In the left of the two sections both the spaces are patulous, but a close inspection shows that the mucosa is beset with nodular elevations, and the sacculus with flattened, leaf-like processes. In the other section the ventricle and the sacculus are easily recognisable, but from the upper part of the sacculus there project two lamelliform processes with slightly enlarged free ends, which occupy the cavity of the ventricle, from which the higher slightly projects. Tracheotomy has been performed."

"*A microscopic section* of one of the processes showed it to contain numerous giant-celled systems. The mucosa in general is the seat of a papillary hyperplastic tuberculosis" (Fig. 25).

<sup>\*</sup> See Museum Catalogue, Throat Hospital, Golden Square, p. 20.

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## *Etiology of Eversion of the Sacculus.*

It is highly probable that chronic inflammatory conditions of the sacculus may furnish one of the predisposing causes by producing relaxation of its supports, and subsequently leading to eversion as a result of the negative pressure induced by coughing.

Nolan Mackenzie,<sup>17</sup> in recording his two cases of "prolapse of the ventricle," and employing the term ventricle as synonymous with sacculus, discusses the question of etiology of "eversion of the sacculus," and has suggested that long-continued inflammation may lead to infiltration and fatty degeneration, and finally induce a paralytic state of the muscular surroundings of the sac, leading eventually to abrogation of the suspensory function of the internal fibrous ligament of Hilton—in other words, a perisaccular inflammation accompanied by fatty degeneration and wasting of muscles. Again, he suggests that descent of the sac may be facilitated by hyperplasia of the areolar tissue surrounding it, which may push the walls of the sac downwards towards the cavity of the larynx. Later on, when eversion is complete, strangulation of the mass takes place and the sac presents in the laryngeal cavity as a congested tumour.

Cysts may possibly arise in the saccular wall and cause eversion; those cases recorded by Fletcher Ingals,<sup>68</sup> Koschier,<sup>9</sup> and Joseph Cohen,<sup>70</sup> probably originated primarily as cysts of the sacculus, and secondarily produced eversion of the ventricle. As demonstrated by the specimen of Koschier,<sup>9</sup> eversion of the ventricle may be caused by the weight of a tumour growing in and dragging on its walls, and everting the sacculus (see p. 346).

Shattock<sup>78</sup> suggested at the December (1921) meeting of the Section of Laryngology, Royal Society of Medicine, that *negative pressure* caused by violent coughing is the main factor in producing eversion of the sacculus, and has demonstrated, by means of a model, the mode in which this may take place. He refers to the effective closure of the glottis which precedes coughing, and which takes place at the site of the true cords; and he points out that any approximation of the ventricular bands can be only a concomitant, seeing that the latter are unprovided with muscle. He says: "When the glottis is suddenly opened in coughing, the blast of liberated air rushes by the ventricle and orifice of the sacculus; and if often repeated the negative pressure so induced may lead first to some degree of loosening

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of the attachments of the sacculus, and then to its complete eversion. There may be another factor. The need of occasionally 'clearing the throat,' whilst speaking, is possibly due to the descent of mucus from the sacculus and its engagement in the glottis, which impairs the proper vibration of the cords; a slight expiratory effort dislodging the secretion and restoring the voice. The act of forcible coughing might thus, should an unusual amount of stringy mucus project from the sacculus, be followed by a drag which would tend to empty the latter and loosen its connections."

The model exhibited by Shattock was constructed out of a length of rubber tubing of the size of the trachea, near the top of which an oval slit had been cut horizontally into its side, and over this had been fixed a short piece of the blind end of a thin rubber finger-cot. Each time the tube was blown through, the finger-cot collapsed, being drawn inwards by the *negative* pressure so produced. If the distal end of the tube was closed, so as to make the pressure *positive*, the cot became distended so as to rupture, or was blown away from the oval rim over which it was fixed.

On the question of closure of the glottis, Howarth<sup>98</sup> has demonstrated that "if the larynx is examined by the direct method, it will be seen that when coughing or any other spasm occurs, the ventricular bands close over the true cords so as to conceal the latter from view. If, however, the bands are pressed upon with a probe, they can be readily displaced; the vocal cords are then disclosed in firm apposition."

## *Symptoms of Eversion of the Sacculus.*

There may be no symptoms as shown by the history of Moxon's case. Slight dyspnœa may be present if the swelling is bilateral and causes narrowing of the glottis. Sudden loss of voice may occur. This, however, as previously stated, need not be construed as due to a sudden eversion but to constriction and congestion of the sacculus at the ventricular opening.

## *Laryngoscopic Appearance and Diagnosis of Eversion of the Sacculus.*

1. The situation of the tumour in the anterior third of the larynx would suggest eversion of the sacculus, but this cannot be depended upon, for even if the swelling is confined

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to the anterior portion it might be a simple hyperplasia, or a spurious form of tubercular hyperplasia (see Figs. 24 and 25).

2. The true vocal cords stand clear of the mass, as may be seen by pressing the free end of the swelling upwards and outwards with a probe. This was observed in Morell Mackenzie's<sup>4</sup> and Moxon's<sup>3</sup> specimens.

3. The contour of the ventricular bands is not lost. Its upper border does not merge into the upper surface of the swelling as in eversion of the ventricle, but forms with the tumour a shallow step. This was observed in Morell Mackenzie's specimen. In Moxon's specimen, however, as previously stated, the protrusion of a portion of the mucous membrane of the ventricular band had along with the eversion of the sacculus obliterated the contour of the ventricular band.

4. The tumour may be replaced partially or fully into the ventricle by means of a bent probe, only to fall out again almost immediately.

### *Differential Diagnosis of Eversion of the Sacculus.*

It is said that it can be diagnosed from chronic catarrhal hyperplasia, abscess, and tumours, by its sudden development, but eversion of the sacculus may exist for years, and attention may only be drawn to it by symptoms which suggest a sudden development, but which really are caused by constriction and congestion of its neck at the ventricular orifice.

### *Treatment of Eversion of the Sacculus.*

If causing inconvenience or dyspnoea removal may be necessary. This can be carried out by forceps or snare, but the risk of tearing out or "stripping" the ventricle must be considered. Removal by thyro-fissure suggests itself as the most surgical procedure. A window resection of the thyroid ala in conjunction with endoscopic replacement of the sac, followed by its fixation in its normal position by means of ligatures, or even removal by ligaturing off the sac at its neck, would appear also to offer a satisfactory method of dealing with the condition.

In conclusion, I wish to express my thanks and indebtedness to Professor S. G. Shattock, F.R.S., not only for the Sections he has specially prepared for me, but also for his kind help and advice in compiling the Monograph.



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## BIBLIOGRAPHY.

The following Authors have been studied and referred to in compiling the Monograph :—

- <sup>1</sup> Spicer, Frederick, "Case of Laryngocele," *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 16, 67.
- <sup>2</sup> Lefferts, George M. (New York), "A Unique Case of Prolapse of both Ventricles of the Larynx. Their Removal by the Operation of Thyrotomy: Cure," *New York Med. Rec.*, 1876, xi., 359.
- <sup>3</sup> Moxon, Walter (Guy's Hosp.), "Case of Eversion of the Sacculus Laryngis," *Trans. Path. Soc. Lond.*, 1868, xix., 65; described by Arthur Durham: Holmes's *Syst. Surg.*, 1883, 3rd Edit., ii., 693.
- <sup>4</sup> Mackenzie, Morell, *Growths in the Larynx*, Lond., 1871, 34-35; *Dis. of Throat and Nose*, 1880, i., 310-404.
- <sup>5</sup> Möller, Jorgen (Copenhagen), "Einige Bemerkungen über den sogenannten Prolapsus Ventriculi Morgagni," *Archiv. für Laryngologie und Rhinologie*, 1905, 408; (Abstr.) *Internat. Centralblatt für Laryngol.*, 1906, xxii., 142, and 1908, xxiv., 81.
- <sup>6</sup> Lussan, Roger (Paris), "Contribution à l'étude du prolapsus du ventricule de Morgagni," "Thèse de Bordeaux," 1898. Literature unobtainable.
- <sup>7</sup> Stoerk, Karl (Berlin), *Krankheiten des Kehlkopfs*, 1880, 205; *Die Erkrankungen der Nase, des Rachens, des Kehlkopfes und der Lufttröhre*, Wien, 1897, ii., 175-76.
- <sup>8</sup> Fränkel, B. (Berlin), "Der sogenannte Prolapsus des Morgagnischen Ventrikels," *Arch. f. Laryngol. u. Rhinol.*, Berlin, 1893-4, i., 369-87.
- <sup>9</sup> Koschier, Hans (Vienna), "Ueber Prolapsus Sinus Morgagni," *Wein klin. Woch.*, 1897, x., 815-20.
- <sup>10</sup> Mygind, Holger (Copenhagen), *Die Krankheiten der oberen Luftwege*, Berlin, 1901, 200.
- <sup>11</sup> Garel, J. (Lyons), "Un cas d'éversion ventriculaire," *Rev. hebdomadaire de Laryngol., d'Otol., et de Rhinol.*, Paris, 1901, xxi., 11, 305-12; "Laryngocele ventriculaire," *Lyons Médical*, 1904, 419.
- <sup>12</sup> Delsaux, V. (Brussels), "Prolaps des Ventriculus Morgagni," *Internat. Centralblatt für Laryngol.*, 1903, xix., 319; "Ausstülpung oder Vorfall des Ventric. Morgagni," *Internat. Centralblatt für Laryngol.*, 1905, xxi., 78; (Abstr.) *Journ. Laryngol., Rhinol., and Otol.*, 1905, xx., 397.
- <sup>13</sup> Horne, Jobson, "Tumours of the Ventricle and Ventricular Bands." A paper read before the Sect. of Laryngol., Roy. Soc. Med., on 4th Feb. 1921; vide *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 27.
- <sup>14</sup> Galen, *De Usis Part. Corp. Hum.*, i., 7, cap. xxiii.
- <sup>15</sup> Morgagni, Jo. Baptista, "Adversaria Anatomica," 1741, 16, *Anat. Lugd. Batav. L.*, xvi., 19.
- <sup>16</sup> Savart, M. Felix (Paris), "Mémoire sur la Voix Humaine," *Journ. de Physiologie*, 1825, v., 367.
- <sup>17</sup> Mackenzie, J. Nolan (Baltimore), "Prolapse of the Laryngeal Ventricle, with Illustrative Cases," *Med. News*, Philadelphia, 1882, xl., 567-69.

# Irwin Moore

- <sup>15</sup> Cruveilhier, J. (Paris), *Anatomie*, Paris, 1834, i., 677.
- <sup>19</sup> Hilton, John, "Description of the Sacculus or Pouch in the Human Larynx," *Guy's Hosp. Reports*, 1837, ii., 519.
- <sup>20</sup> Rüdinger (Berlin), "Beitrag zur Anatomie des Kehlkopfes," *Monatschr. f. Ohrenheilkunde*, 1876, x., 122-27.
- <sup>21</sup> Browne, Lennox, *The Throat and Nose and their Diseases*, 1899, 5th Edit., 29-649.
- <sup>22</sup> Bosworth (New York), *Dis. of <sup>N</sup><sup>os</sup> e and Throat*, 1892, New York, 11, 714-15.
- <sup>23</sup> Cunningham, D. J., *Text-Book of Anatomy*, 1906, 2nd Edit., 967.
- <sup>24</sup> Quain, Richard, *The Elements of Anatomy*, 1896, 10th Edit., iii., pt. 4, 152, 154, 156.
- <sup>25</sup> Morris, Henry, *Human Anatomy*, 1915, 5th Edit., 1223.
- <sup>26</sup> Piersol, Geo. A. (Philad.), *Human Anatomy*, 1918, ii., 1822.
- <sup>27</sup> Monselles, S. (Florence), "Ueber das Vorkommen eines auf der Eversion einer Morgagni'schen Tasche aufsitzenden Polypus Laryngis," *Monatschr. f. Ohren.*, Berlin, 1900, xxxiv., 189-94.
- <sup>28</sup> Albrecht, H. (Vienna), "Beitrag zur vergleichenden Anatomie des Säugethier-Kehlkopfes," *Sitzungsberichte d. k. Akad. d. Wissensch.*, 1896, cv., 277.
- <sup>29</sup> Sisson, Septimus S. B. (Philadelphia), *The Anatomy of the Domestic Animals*, 1914, 2nd Edit., 522; *Text-Book of Veterinary Anatomy*, 1910, Philad., 447.
- <sup>30</sup> Chiari, Ottokar (Vienna), "Ueber Prolapsus Ventriculi Morgagni," *Wien klin. Woch.*, 1895, viii., 487-80.
- <sup>31</sup> Schroetter, L. (Vienna), *Vorlesungen über die Krankheiten des Kehlkopfes der Luftröhre*, Wien, 1887, 101.
- <sup>32</sup> Noack, A. (Lyons), "De l'Eversion ventriculaire," *Rev. hebdom. de Laryngol.*, Paris, 1898, xviii., 1297-1308.
- <sup>33</sup> Chappell, Walter F. (New York), "A Case of Eversion of the Ventricles of the Larynx, with a New Method of Treatment," *Med. Rec.*, New York, 1893, xliii., 11.
- <sup>34</sup> Waldenburg, L. (Berlin), "Eine laryngologische Studie," *Berlin klin. Woch.*, 1881, xviii., 212.
- <sup>35</sup> Elsberg, Louis (New York), "Case of Eversion and Prolapse of both Sacculi Laryngis: Successful Intra-laryngeal Extirpation of One, and almost Complete Reduction of the Other," *Archives of Laryngol.*, New York, 1882, iii., 67-70.
- <sup>36</sup> Solis-Cohen, J. (Philadelphia), "A Case of Prolapse of the Laryngeal Sac," *Archiv. Laryngol.*, 1882, iii., 66-67; "Phonatory Pneumatic Distension or Hernia of the Laryngeal Sac; a Clinical Note," *Med. News*, Philad., 1887, li., 707.
- <sup>37</sup> Semon, Felix, "Eversion of the Left Ventricle of Morgagni," *St Thomas's Hosp. Reports*, 1884, N.S. xiii., 168.
- <sup>38</sup> Major, G. W. (Montreal), "Prolapse of the Laryngeal Ventricles," *Trans. Amer. Laryngol. Assoc.*, 1886, New York, 1887, viii., 117-120; *New York Med. Journ.*, 1887, xlv., 4.
- <sup>39</sup> Massei, F. (Naples), "Patologia e terapia della faringe, etc.," 2nd Edit., 1882, 255. Cited by Fränkel, see Ref. "I punti sugli rivista critica di rinol. e laryngol., 1886." Cited by Noack, *Rev. hebdom. de Laryngol.*, Paris, 1898, xviii., 1297. (Original literature unobtainable.)

# Prolapse of the Laryngeal Ventricle

- <sup>40</sup> Jellenfy (Budapest), "Ueber ein neues Kapital der Larynx chirurgie," *Pester Med. Presse*, 1887; *Wien Med. Woch.*, 1887, xxxvii., 1326.
- <sup>41</sup> Przedborski, L. (Lodz), "Wypadnienie blony sluzawej zatoki Morgagniego" (Prolapse of the Ventricle of Morgagni), *Gazeta Lekarska*, 1888, Nos. 51 and 52; (Abstr.) *Internat. Centralblatt für Laryngol.*, 1890, vi., 608.
- <sup>42</sup> Gouguenheim, A. (Paris), "Prolapsus du ventriculi de Morgagni et tuberculose du larynx," *Cong. Internat. d'Otol. et de Laryngol.*, Paris, 1889, 243-49; *Ann. d. mal. de l'oreille, du larynx, etc.* (Paris), 1889, xv., 549-55.
- <sup>43</sup> Ruault (Paris), "Discussion on Case shown by Gouguenheim," *Internat. Centralblatt für Laryngol.*, 1891, vii., 127.
- <sup>44</sup> Botey, Ricardo (Barcelona), "Un caso de eversion del ventriculo derecho," *Archiv. Internac. de Laringol., Otol.*, Paris, 1891, ii., 1-4; cited by Chiari, *Internat. Centralblatt für Laryngol.*, 1896, xii., 131. (Original reference unobtainable.)
- <sup>45</sup> Beausoleil, R. (Bordeaux), "Éversion du Ventricule de Morgagni," *Rev. de Laryngol., etc.*, Paris, 1892, xii., 471-76.
- <sup>46</sup> Zwerthal, W. (Bologna), cited by Beausoleil in 1892, *Rev. de Laryngol., d'Otol., et de Rhinol.*, 1892, 472. (Original reference unobtainable.)
- <sup>47</sup> Scheinmann (Berlin), "Ueber Eversion des Ventrikels," *Verhandl. der Laryng. Gesellschaft. zu Berlin*, iii., 29; (Abstr.) *Internat. Centralblatt für Laryngol.*, 1892, viii., 56.
- <sup>48</sup> Rosenberg, A. (Berlin), Discussion on Case shown by Scheinmann, *Internat. Centralblatt für Laryngol.*, 1892, viii., 56.
- <sup>49</sup> Schutter, W. (Amsterdam), "Fall von Prolaps der Schleimhaut des sinus Morgagni," *Weekbl. van het Nederl. Tijdschr. voor Geneesk.*, No. 1, July 1891; (Abstr.) *Internat. Centralblatt für Laryngol. u. Rhinol.*, 1892, viii., 557.
- <sup>50</sup> Landgraf (Berlin), "A Case of Eversion of the Ventricle after the Mucous Swelling had been removed," *Internat. Centralblatt für Laryngol.*, 1894, x., 112.
- <sup>51</sup> Merrick, S. K. (Baltimore), "A Laryngeal Neoplasm simulating the Everted Ventricle," *Journ. Amer. Med. Assoc.*, 1894, xxiii., 466.
- <sup>52</sup> Jones, W. S. (Camden, New Jersey), "Prolapse of the Laryngeal Ventricle," *Med. News Philad.*, 1895, lxvi., 127.
- <sup>53</sup> Schnitzler, J. (Vienna), "Klinischer Atlas der Laryngologie," 1895, *Illustrat.*, Taf. xxiv., Fig. 6.
- <sup>54</sup> Zwillinger, H. (Budapest), "Prolapsus Ventriculi Morgagni," *Orvosi Hetil.*, Budapest, 1898, xiii., 72; *Monatschr. f. Ohren.*, Berlin, 1898, xxxii., 75-77.
- <sup>55</sup> Polyak (Budapest), Discussion on Zwillinger's Case, *Monatschr. f. Ohren.*, 1898, xxxii., 75.
- <sup>56</sup> Lichtwitz, L. (Bordeaux), "Un cas de prolapsus double du Ventricule de Morgagni guéri par l'ablation," *Arch. Internat. de Laryngol., etc.*, Paris, 1898, xi., 467-70; *Gaz. hebdom. d. Sc. méd. de Bordeaux*, 1898, xix., 375.
- <sup>57</sup> Lublinski (Berlin), *Verhandl. der Laryng. Gesellschaft.*, iii., 29; cited by Monselles in 1900. (Literature unavailable.)

# Irwin Moore

- <sup>55</sup> Sota, Ramon de la (Seville), "Prolapso dal ventriculo laringeo," *Revist. Medic. de Sevilla*, July 1902, No. 15. (Original paper unobtainable); (Abstr.) *Internat. Centralblatt für Laryngol.*, 1903, xix., 421; reviewed the Etiology and Pathology of "Prolapse of the Ventricle."
- <sup>56</sup> Ilyin, P. V. (Moscow), "Vivorot Morgagnieva Zheludochka" (Eversion of Morgagni's Ventricle); *Khirurgia*, Mosk., 1903, xiii., 19-24. (Original literature unobtainable.)
- <sup>60</sup> Sturmman (Berlin), A Case exhibited at the Berlin Laryngol. Soc., *Internat. Centralblatt für Laryngol.*, 1904, xx., 259.
- <sup>61</sup> Heymann, P. (Berlin), "A Case of Prolapse of the Ventricle," *Internat. Centralblatt für Laryngol.*, 1904, xx., 418.
- <sup>62</sup> Heyninx (Brussels), Discussion of Delsaux's Case, *Internat. Centralblatt für Laryngol.*, 1905, xxi., 78.
- <sup>63</sup> Abraham, Joseph H. (New York), "A Case of Traumatic Laryngitis with Eversion of the Laryngeal Ventricle," *Laryngoscope*, 1907, xvii., 86.
- <sup>64</sup> Reardon, Timothy J. (Boston), "Acute (Edematous Eversion of the Ventricle of Morgagni," *New York Med. Journ.*, 1907, lxxxv., 1211.
- <sup>65</sup> Navratil, E. von (Budapest), "Prolapse of the Mucous Membrane between the Left False and True Vocal Cords," *Internat. Centralblatt für Laryngol.*, 1910, xxvi., 447.
- <sup>66</sup> Lang, K. von (Budapest), "Mittels Laryngofissio operirter und geheilter Fall eines Prolapses der Morgagni'schen Tasche," *Internat. Centralblatt für Laryngol.*, 1914, 527.
- <sup>67</sup> Scheier, Max (Berlin), "Fall von mächtigem Prolaps des ventriculus. Morgagni beiderseits," *Berliner klin. Woch.*, 1918, lv., 1. 413.
- <sup>68</sup> Ingals, E. Fletcher (Chicago), "Eversion of the Ventricle of the Larynx, and Cyst involving the Larynx and Side of the Neck," *Journ. Amer. Med. Assoc.*, Chicago, 1899, xxxii., 334.
- <sup>69</sup> Whale, Lawson, "Discussion on Frederick Spicer's Case," *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 19.
- <sup>70</sup> Cohen, Joseph (Cologne), "Ueber eine mit der Schlinge entfernte Zyste des Ventriculus Morgagni," *Zeitsch. für Laryngol. u. Rhinol.*, 1921, Bd. 10, 41.
- <sup>71</sup> Salomon, Walter (Heidelberg), "Über Larynxzysten," *Zeitschr. für Ohrenheilk.*, 1911, Bd. 62, 49.
- <sup>72</sup> Schwartz, E. E. (Paris), *Des Tumeurs du Larynx*, 1886, 35.
- <sup>73</sup> Ulrich, Richard (Würzburg), *Über Kehlkopfzysten*, Dissertation, Würzburg, 1887.
- <sup>74</sup> Moure (Bordeaux), "Les Tumeurs Kystiques du Larynx," *Cong. Internat. Laryngol.*, 1880, i., 227; *Études sur les Kystes du Larynx*, Paris, 1881; cited by Noack, "De l'Éversion Ventriculaire," *Rev. hebdomadaire de Laryngol.*, Paris, 1898, xviii., 1297; "Laryngocèle; présentation de malade," *Mém. et bull. Soc. de Med. et Chir. de Bordeaux*, 1894, 257.
- <sup>75</sup> Glas, Emile (Vienna), "Über Larynxzysten," *Zeitschr. für Ohrenheilk.*, 1911, Bd. 62, 49.
- <sup>76</sup> Coakley, Cornelius (New York), *Disease of Nose and Throat*, 1900, p. 399.

# Prolapse of the Laryngeal Ventricle

- <sup>77</sup> Dundas-Grant, Discussion on Epidiascopic Demonstration by Irwin Moore of Two Authenticated Specimens of Eversion of the Sacculus Laryngis, *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 30; "Specimen to show Artificial Emphysema of the right half of the Larynx, produced by pressure of air through the Trachea after a puncture of the subcordal mucous membrane," *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 58.
- <sup>78</sup> Shattock, S. G., "Model showing the Mode in which the Sacculus Ventriculi Laryngis might be everted by the Negative Pressure caused by Coughing," *Proc. Roy. Soc. Med.*, 1922, xv. (Sect. Laryngol.), 6.
- <sup>79</sup> Uckermann (Christiania), "Eversio Ventriculi Morgagni," *Internat. Centralblatt für Laryngol.*, 1914, xxx., 424.
- <sup>80</sup> Bennett (Dublin), "Malformation of the Larynx," *Dublin Quart. Journ. of Med. Sci.*, 1865, N.S. xl., 427.
- <sup>81</sup> Parker, R. W., "Congenital Tumour in the Right Side of the Neck, rising and falling with Respiration," *Trans. Clin. Soc. Lond.*, 1886, xix., 322.
- <sup>82</sup> Gruber, Wenzel (St Petersburg), "Partly Extra-laryngeal Lateral Ventricular Sacs on Both Sides," *Archiv. Physiol. für Anat. u. Wissenschaftl. Medicin.*, Leipzig, 1874, 606; "Discourse on the Medial and Lateral Ventricular Sacs lying outside the Larynx in Anthropoid and other Apes," *Archiv. für Anat. und Physiologie*, 1874, 620; "Two Larynges preserved in Munich Museum," *Jahresbericht u. d. Fortschritte, Leistungen i. d. gesamten Medicin f. d. J.*, 1874, Bd. i., Abt. i., Berlin, 1875, 17; Case of a Ventricle lying partially outside the Larynx on its Lateral Aspect—on the left side" (one illustration—human), *Archiv. für Pathologische, Anatomie und Physiologie*, Berlin, 1876, lxxvii., 361; "A Larynx exhibiting ventricular sacs situated laterally and partially outside it," *Observations on Human and Comparative Anatomy*, Berlin, 1879, 46; "Case of larynx with right ventricle lying partially outside and to the side of it" (in a human subject and illustrated), *Archiv. für Pathologische, Anatomie und Physiologie*, Berlin, 1879, lxxviii., 106.
- <sup>83</sup> Virchow (Berlin), *Die Krankhaften Geschwülste*, 1867, iii., Pt. 1, 35.
- <sup>84</sup> Hansberg (Dortmund), "Laryngofissure bei Laryngocèle," *Katz's Handbuch d. Spez. Chir. d. Ohren. u. d. ob. Luftwege*, 1913, iv., 192.
- <sup>85</sup> Pelletier, M. (Paris), "Contribution a l'Étude des Laryngocèles," *Thèse de Paris*, 1900.
- <sup>86</sup> Bröesicke, G. (Berlin), "Ueber einen Fall von medianem ventriculus laryngis tertius," *Archiv. für path. Anat. und Physiol.*, 1884, Bd. xcvi., 342.
- <sup>87</sup> Godlee, Rickman, and Bucknall, "A Pharyngeal Pouch of Large Size removed by Operation," *Lancet*, 1901, i., 1387.
- <sup>88</sup> Henle, Adolph (Breslau), *Allg. Med. Zentralzeit.*, Leipzig, 1904, No. 32; cited by Hansberg.
- <sup>89</sup> Ledderhose (Strasburg), *Deutsche Zeitschr. f. Chirurgie*, 1889, xxix., 411.
- <sup>90</sup> Benda and Borchert (Berlin), *Berlin. klin. Woch.*, 1897, xxxii., 687.
- <sup>91</sup> Kan (Leiden), *Zeitschr. f. Laryngol. u. Rhinol.*, 1909, i., 57.
- <sup>92</sup> Hill, William, Discussion on Jobson Horne's paper, "Tumours of the Ventricle and the Ventricular Bands," *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 28; Discussion on Frederick Spicer's Case of "Laryngocele," *op. cit.*, 1921, xiv. (Sect. Laryngol.), 17.

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- <sup>93</sup> Banks-Davis, H., Discussion on Frederick Spicer's Case, *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 18.
- <sup>94</sup> Layton, T. B., Discussion on Frederick Spicer's Case, *ibid.*, p. 19.
- <sup>95</sup> Moore, Irwin, "The Normal Physiology of the Vocal Cord and Ventricle of the Larynx in connection with the Development of Adenoma," *Proc. Roy. Soc. Med.*, 1919, xii. (Sect. Laryngol.), 201; "Epidiascopic Demonstration of two authenticated cases of Eversion of the Sacculus Laryngis," *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 28. Discussion on Frederick Spicer's Case, *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 18.
- <sup>96</sup> Durham, Arthur, Art. "Diseases of the Larynx," *Holmes's System of Surgery*, 1883, 3rd Edit., ii., 693.
- <sup>97</sup> Faulder, Jefferson, Discussion on Demonstration by Irwin Moore of two authenticated cases of Eversion of the Sacculus Laryngis, *Proc. Roy. Soc. Med.*, 1921, xiv. (Sect. Laryngol.), 28.
- <sup>98</sup> Howarth, W. G., Postscript to demonstration by Prof. S. G. Shattock, *Proc. Roy. Soc. Med.*, 1922, xv. (Sect. Laryngol.), 6.
- <sup>99</sup> Gluckberg (Lyons), "Contribution à l'étude des laryngocèles," *Thèse de Lyons*, 1904.
- <sup>100</sup> Chauveau, A. (Paris), "Comparative Anatomy of the Domestic Animals," translated by G. Fleming, 1873.
- <sup>101</sup> Deniker and Boulart (Paris), "Sur les Sacs Laryngiens des Singes Anthropoïdes," *Journ. de l'Anatomie et de la Physiologie Normales et Pathologiques de l'Homme et des Animaux*, 1886, Paris, 51-62.
- <sup>102</sup> Fick, Rudolf (Leipzig), "Beobachtungen an einem Zweiten erwachsenen Orang-Utang und einem Schimpansen," *Archiv. fur Anat. u. Physiol.* (Anat. Abt.), 1895, 289.
- <sup>103</sup> Ellenberger, W., and Baum, H. (Dresden), *Handbuch der Vergleichenden Anatomie der Haustiere*, Berlin, 1908, 515, 537.

# EPIDEMIC CEREBRO-SPINAL MENINGITIS FROM THE OTO-LARYNGOLOGICAL STANDPOINT.

By DAN M'KENZIE.

My attention first became strongly attracted to this subject in April 1921, by a case which had been sent for an opinion by Dr James Horgan, of Cork.

All otologists, of course, see from time to time deaf-mutes in whom the cause of deafness seems to have been epidemic meningitis,\* but somehow or another it required this particular case to bring home to me what the devastation wrought by this disease may amount to.

The patient was a well-grown youth, 15 years of age. He had been attacked and rendered absolutely deaf by epidemic meningitis, the diagnosis being ascertained by lumbar puncture, in November 1920, that is five months previous to my seeing him, and he had been acutely ill for a couple of weeks only. The deafness had come on at the very commencement of the illness, and after recovery it was found to be absolute or nearly so, although just before I saw him for the first time, the patient himself thought he had regained a little hearing. During convalescence he had manifested an ataxic gait, as so many of these patients do, but that had quite passed off. He had observed occasional dullness of hearing prior to his illness.

The hearing-tests showed that he was deaf to all sound by aërial conduction, but a modicum of hearing for the tuning-forks by bone-conduction was present as follows:—

Tuning-fork conduction	64	heard by right ear for 15"	by left ear for 20"
"	"	128	" " 12" " 18"
"	"	256	" " 10" " 15"
"	"	512	" " 5" " 10"

The higher forks were not heard at all. The vestibular reactions in both ears were absolutely negative.

Nothing could be done for the patient, and he developed subsequently, symptoms of paranoia.

Impressed by a disaster of this magnitude I turned to the literature of the subject, only to find that the amount of

\* We shall use the terms epidemic cerebro-spinal meningitis, epidemic meningitis, and cerebro-spinal fever synonymously in this article.

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information obtainable from this source, relative at least to the clinical features and to the treatment of meningitic deafness is very scanty. And this deficiency applies particularly to the early stages of the ear disease. The epidemiological works I consulted, although they remark that of all the cranial nerves the auditory is the most frequently affected, nevertheless dismiss this serious complication in three or four lines. No mention is made of the appearance of the membrana tympani; there is no record of the results of the hearing and vestibular tests; there is no allusion to the time of its onset, to the character of its progress, or to the chances of its recovery. In a word, the subject suffers from the absence of expert examination and observation until the proper time for such examination and observation is past. This is, of course, regrettable, and it ought to be remedied. It is true that many of these patients become unconscious early in the disease, whilst others are too ill for us to trouble them with an examination. But these drawbacks apply only to some patients; others are well enough to respond to questions and to have the hearing tested, while, to be sure, the tympanic membranes may be inspected whether the patient is conscious or not.

With regard to the treatment of the ear disease, much no doubt may be said for looking upon it as beyond all remedy, when we consider, as we shall do, the pathological condition of a labyrinth succumbing to an attack by the meningococcus. Nevertheless clinicians ought surely to have learned by this time that they need not abandon all hope of curing disease simply because pathologists are pessimistic.

In order to give some idea of the problems encountered in cerebro-spinal fever I propose to detail here a few of the more important points, dealing particularly with such as are of interest to the oto-laryngologist.

### **The Meningococcus in the Naso-pharynx.**

The usual habitat for the meningococcus, the causal organism of epidemic meningitis, is the naso-pharynx, where it can be found both in "carriers" and in sufferers from the developed disease. At one time it was believed that the presence of the organism in the naso-pharynx gave rise to no local changes, and while it is true that the naso-pharynx of healthy contacts may contain the meningococcus without any abnormality being apparent (Weichselbaum and Ghon), on the other hand, it is now



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known that catarrhal inflammation of the naso-pharynx, as well as of the posterior regions of the nose, is a usual phenomenon when the meningococcus is present in these regions, whether the meninges are affected or not.

Westenhoeffer, Meyer, and others found in all the acute cases of the disease examined by them "intensive inflammation" of the naso-pharynx, including adenoids when they are present, as well as catarrh of the mucosa of the Eustachian tube. Dennis Embleton and E. A. Peters also have reported in meningeal cases sphenoidal sinusitis with the meningococcus in the pus from the sinus. (We shall deal more particularly with the work and views of these observers at a later stage.)

After the meningitis subsides and even sometimes before it does so, the meningococcus, according to some observers, rapidly disappears from the nasal and naso-pharyngeal secretions; according to others it may persist for an indefinite period of time.

**The Route to the Meninges.**—The path followed by the meningococcus in passing from the naso-pharynx to the meninges is unknown. Four different routes have been suggested, but none have been actually demonstrated. These are as follows:—

- (1) That the organism reaches the meningeal spaces through the roof of the nose by way of the olfactory nerves and the cribriform plate.
- (2) That it passes by way of the sphenoidal sinus and bone.
- (3) That it passes into the blood-stream to produce a general septicæmia of which the meningitis is merely one of the manifestations; or, without producing septicæmia, that through the circulation it reaches the meninges, and finding there an environment favourable to its activity, multiplies rapidly and so sets up the meningitis.
- (4) The fourth theory has hitherto attracted very little attention. It is that the meningococcus, following the route so familiar to otologists, passes like the ordinary bacteria of suppuration via the Eustachian tube and the middle ear to the labyrinth and the meninges.

We shall discuss these four theories seriatim—

**The Olfactory-Cribriform Route.**—This suggestion seems to have a powerful fascination for many writers, and yet there does not seem to be any clinical or pathological evidence

whatever in its favour. And against it is the fact that there is no post-mortem indication that the meningitis ever begins in the anterior fossa of the cranium. Quite the contrary, indeed, since MacLagan says: "In a post-mortem experience of over 100 cases I have observed that the pia-arachnoid, in the region of the olfactory lobes is practically always free from obvious infiltration." This theory may therefore be dismissed out of hand.

**The Sphenoidal Route.**—The second view, which also claims a nasal route for the invasion of the meninges, is presented with more substantial backing. Dennis Embleton and E. A. Peters in three adult cases of cerebro-spinal meningitis found sphenoidal sinus suppuration, the pus from which contained the meningococcus; and in two of the cases the organism was demonstrated post-mortem in inflamed bone around the sinus. Recently Embleton himself has confirmed his earlier finding, and we may add by the way that he does not favour operation on the sinus during the course of the disease as the cases he has seen so treated have died. (Peters, however, reports a recovery after operation.)

It will be observed that although the organism was found in the sphenoidal sinus and in the surrounding bone, Embleton makes no claim to have traced it any further. There is still remaining the gap between the bone and the meningeal spaces to be bridged. Embleton's suggestion that the organism passes from the bone to the meninges "by the lymphatics" may or may not turn out to be correct. At present all we know is that the organism has not been shown to us as taking such a lymphatic route.

In this connection we must refer to Westenhoeffer, who found in cerebro-spinal fever a considerable amount of purulent exudate in the neighbourhood of the pituitary body. But he remarks that it was the lateral portions of the hypophysis that were principally affected by the suppuration, the inferior part, that which rests on the body of the sphenoid, being always free of pus. That being so, this author concludes that the suppuration passes towards the hypophysis from above or from the side, never from below. In other words, he holds that the infection around the pituitary body comes from the meninges and not from the sphenoid. (These findings and the inference drawn from them may be compared with what is stated to occur in the labyrinth. See later.)

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Again, in further criticism of the sphenoidal route we may cite the observations of Meyer, who states that in 100 cases of cerebro-spinal meningitis he never found any evidence of disease, and adds further that cerebro-spinal fever is common in little children before the sphenoidal sinus is developed.

Finally, it is necessary to remark that, so far, the views of Embleton and Peters do not seem to have been corroborated by other observers.

**The Blood-stream Route.**—According to this, the third view, whether the disease is a general septicæmia or not, the organism reaches the meninges in the blood-stream. This explanation has one great advantage over the others in that it is easier to affirm than to deny, since it is not controverted by any unequivocal evidence of a spread by contiguity from the naso-pharynx. Moreover, it is supported by analogy with such diseases as pneumonia and typhoid fever, where, although the brunt of the disease is usually borne by the pulmonary tissues and Peyer's patches in the intestine respectively, there is no doubt as to the presence of the pneumococcus and the typhoid bacillus in the blood. As a matter of fact, the analogy goes further, since, like the pneumococcus and the typhoid bacillus, the meningococcus sometimes, though rarely, sets up such local diseases as arthritis.

The organism has, besides, been repeatedly cultivated from the blood both of carriers and of patients suffering from meningitis. Andrews, moreover, has reported a case which died of simple septicæmia due, apparently, to the meningococcus, as it was obtained from the blood in pure culture, while no changes whatever were found post-mortem in the meninges. Elser and Huntoon, again, found that 24 per cent. of their cases of meningitis gave positive blood-cultures and the earlier the cases were examined the greater was the proportion of positive results, a point strongly in favour of this theory. (Quoted by Maclagan.)

Further, Maclagan himself has found many cases in which the septicæmic phenomena were pronounced while those of meningitis were slight, and he considers that in such cases the infection of the blood must have been primary and that of the meninges secondary.

Maclagan is not inclined to look upon meningococcus arthritis and pericarditis as indications of primary blood-

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infection, since they are late manifestations in the course of the disease and may therefore be secondary to the meningitis.

The evidence in favour of the septicæmic theory is undoubtedly strong, nevertheless it does not want for critics. With regard to the argument from analogy, to begin with, it must be admitted that analogy is not a very reliable guide in medicine. Moreover, it would seem that the organism is not constantly or invariably present in the blood, if, that is to say, a failure to cultivate it from the blood is to be taken as a reliable indication of its absence. As we have just seen, Elser and Huntoon were able to find it, not in every case, but only in 24 per cent. of the cases examined.

Again, we are told that it may be found in the blood of carriers. But if so, then its presence in the blood does not necessarily lead to meningitis, for carriers, apart from their harbouring the meningococcus, may not show any abnormality and may never develop the meningeal disease. Thus we are compelled to infer that some factor other than the presence in the blood of the organism must come into operation before the meningitis can appear.

### **The Route by the Eustachian Tube and the Middle Ear.—**

We turn lastly to the ear, and we may premise what we have to say with the warning that, owing to certain pathological findings about to be mentioned, the possibility of this avenue of approach being selected has occurred to but few observers, and when it has been mooted, the suggestion has always encountered very strong opposition.

As is well known, and as the grave permanent deafness so often shows, a purulent labyrinthitis of a very destructive nature may occur in cerebro-spinal fever. The destruction which follows the invasion of the labyrinth by the meningococcus is frequently both rapid and complete, obliteration of all the soft structures being effected in a few days, or even, it would sometimes appear, in a few hours. But here, as in the meninges, the severity of the attack shows great variation. Ofttimes considerable areas of the organ escape damage altogether, as, for example, when only the basal coil of the cochlea is implicated, the rest of the labyrinth remaining intact, or suffering but slightly.

Furthermore, as in the meninges, the disease in the labyrinth is self-limiting, so that even in severe cases, when they come to post-mortem, one can occasionally find evidence of

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attempts at natural cure in the transformation of granulation into scar-tissue and even into bone.

Now most authorities agree that the pathological appearances plainly indicate that the infection reaches the labyrinth, not from the tympanic cavity, but from the meninges. The purulent labyrinthitis, that is to say, they consider to be secondary to the meningitis and not to a purulent otitis media. Thus the order of events familiar to the otologist in ordinary septic infection of these regions is reversed. Indeed, many microscopists have been able to trace to their satisfaction the precise route by which the infection reaches the labyrinth. Goerke, for example, out of 19 temporal bones investigated, found himself able to determine the exact route in no fewer than 14 instances. In 11, it had travelled by the acoustic nerve; in 3, by the aquæductus cochleæ.

## **The Middle Ear in Cerebro-spinal Fever.**

The condition of the middle ear in cerebro-spinal fever when purulent labyrinthitis is present, is one which demands close attention. According to some authorities, in spite of the widespread destruction in the adjoining labyrinth, the tympanic cavity is, generally speaking, free from any abnormality. But others, again, have found changes. Sometimes these amount to no more than a little extravasation of blood into the niche of the oval window (Schwabach). Sometimes there is pus in the middle ear but only in the neighbourhood of the fenestræ and of the sinus tympani, a position which, as J. S. Fraser and J. K. Milne Dickie and others have pointed out, is highly suggestive of infection from within, that is, from the labyrinth.

It may be that we are here only dealing with a leucocytic drift towards a closed infective focus, comparable to hypopyon in corneal ulcer, or, to come back to the ear, to the serous labyrinthitis that sometimes attends upon an acute infection confined to the middle ear. We should expect, of course, if this were merely a leucocytic drift in the middle ear, that the pus forming there would be sterile. Direct infection of the tympanic cavity, however, has been reported. Schwabach describes a case in which paracentesis was performed for suppuration in both middle ears during the course of cerebro-spinal fever. The ears dried up and the membranes healed, but the case proved fatal, and the post-mortem showed that infection had reached the middle ear from the labyrinth

through destruction of the upper part of the annular ligament, and pus was still present in the niches of the fenestræ.

In this matter, it seems to me, further information is wanted regarding the presence or absence of the meningococcus in the middle ear. If the pus here proved to be sterile, then, quite apart from its location or distribution, its dependence upon the labyrinthitis would be probable. If, again, it were found to contain one or other of the ordinary organisms of sepsis a source of fallacy would be removed. If, however, it were found to contain the meningococcus the inference would not be so clear, during life at all events. On the one hand, it might be due to the passage of the organism through the fenestræ or otherwise from the labyrinth. On the other hand, the equally strong presumption might be raised that the infection of the middle ear had been induced by the meningococcus passing from the naso-pharynx up the Eustachian tube, which, as we have already seen, may show catarrhal changes in such cases. Thus, looking at the matter without prejudice, we are impelled to consider whether the otitis media may not actually be the focus from which first the labyrinth, and second the meninges become infected.

It is this last suggestion which we now proceed to discuss. Its bearing upon the whole question requires no laboured exposition. And as this is the route followed so frequently by septic organisms we can appeal to analogy with as much confidence as those who hold to the blood-stream theory.

As a matter of fact, the following citations show that suppuration of the middle ear during an attack of cerebro-spinal fever, the meningococcus being present in the pus of the middle ear, has been repeatedly observed and recorded.

We pause here to draw attention to the fact that great care is necessary not to confuse the meningococcus with the commoner micrococcus catarrhalis—and vice versâ. The distinction can only be made by culture. Furthermore, many of the records we are about to quote cannot be considered as modern, dating back as they do fourteen or fifteen years. Consequently, therefore, it is necessary to be cautious before accepting them at their face value. Nevertheless, after every allowance has been made, the following constitute a series of statements and opinions, the significance of which, in discussing the origin of the meningeal infection, ought perhaps to be more generally recognised.

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Goeppert (in 1906) found distinct evidence of otitis media as early as the third day of the meningitis, and the positive cases increased in number with every week of the disease. Still, as he says, the existence of suppuration of the middle ear in moribund patients is a matter of little importance. In the epidemic investigated by this observer no fewer than 47 cases showed during life signs of middle ear suppuration, while it was found in 30 out of 48 post-mortems (*i.e.* 62 per cent.).

Westenhoeffer found otitis media in 17 out of 29 post-mortems, 16 being children and one an adult (*i.e.* approximately 58 per cent.). He concludes that purulent otitis media must be always present in children and from the very beginning. The same author came across ambulant cases in which aural suppuration had been present from the start, and in three of these cases he found the meningococcus in the pus of the middle ear.

Frohmann also, and Alt, finding the same organisms in the middle ear were so impressed by the discovery that they came to regard this as the portal of entry to the meninges.

Hessler goes further even than these last. He reports a sporadic case of epidemic cerebro-spinal meningitis (*Genickstarre*) following acute suppuration in both middle ears. The post-mortem showed, it is stated, that the meningeal disease had been set up by infection from the right tympanum. (Unfortunately I can only quote this important communication at second hand from the *Zeitschr. f. Ohrenheilk*, 56, 1908, p. 361, the original in the *Allgemeine Wiener Med. Zeitschr.*, No. 4, 1908, not being accessible.)

It is suggested by one of the foregoing writers that the middle ear suppuration is liable to escape notice as the more prominent meningitic phenomena dwarf the ear symptoms, while the deafness is regarded as part and parcel of the meningitis; and if otorrhœa be accidentally discovered it is usually assumed to be merely septic.

Goeppert gives some valuable information regarding the signs and symptoms of the middle ear suppuration that accompanies cerebro-spinal fever. The membrane presents the same appearance as it does in the otitis of cachectic infants (and we may add of the moribund); its colour is dull with solitary vessels visible on it, and before rupture the pus shining through gives to it a snowy-white appearance. It seldom perforates, and then not as a rule until the third or fourth week. (The condition of the hearing in these circumstances is not mentioned.)

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Levinger refers the low inflammatory reaction in the middle ear to the feebly irritative effect of the meningococcus upon the tissues, a point which later on we shall estimate the importance of upon the general question.

Cases of mastoid suppurative referred to the meningococcus have also been recorded, the most striking and detailed being one operated on by von Stein, which we may transcribe at some length here.

The patient was a child 6 years of age suffering from typical cerebro-spinal meningitis. On the tenth and eleventh days right-sided and then left-sided otorrhœa appeared, the discharge consisting of a thin mucus, like white of egg. The membrane was dulled slightly but not injected, in the manner we have just noted. There was a perforation in the antero-inferior quadrant. The mastoid (side not stated) was opened on the twentieth day of the illness. In the antrum and cells a clear, glassy mucus, mixed here and there with pus, was found. The cranium was trephined (? opened: *trepaniert*) and the lateral sinus exposed. Through the opening the same kind of glassy mucoid fluid emerged, continuing to flow for several days. (It is not stated that the dura was incised.) Both in this material and in the meatal discharge the diplococcus intracellularis of Weichselbaum was found. (It is not stated whether the organism was cultivated.) After the operation gradual and very slow improvement took place and the child recovered entirely, forty-two days after operation. The condition of the hearing during and after the illness is not recorded.

We have now set out in detail the two opposing theories regarding the infection of the middle ear and labyrinth, and also, by implication, regarding the route to the meninges. From what we have just seen there is obviously more to be said for the Eustachian tube-tympanic route than most authorities imagine. But these authorities have upon their side the testimony of the microscope—excluding Hessler's case referred to above. No experienced histologist, I suppose, would deny that the sections figured by J. S. Fraser, for example, clearly indicate that the labyrinthitis, with its plentiful evidence of purulent disease, must have been antecedent to the mild and even trifling reaction in the tympanum.

But here we encounter an unexpected difficulty. Are the microscopic appearances capable of no other interpretation?



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Are we quite satisfied that from the microscopic appearances alone we can determine the direction in which the disease has travelled? It is true that the trunk of the acoustic nerve is infiltrated, like the meningeal spaces, with pus. It is true that the coils of the cochlea are similarly and as extensively involved. It is true that the connection between meninges and labyrinth is free and open, so that inflammatory disease implicating the one readily passes to the other. Finally, there is no denying that the evidence of disease in the middle ear is but slight. Nevertheless there is, when we are dealing with the meningococcus, a source of fallacy which we must consider before we can give an immediate and unqualified assent to the orthodox view. The difficulty arises from the fact, which most observers seem ready to admit but of which they do not always seem to have realised the importance, that while the meningococcus induces a violent reaction in the meningeal spaces, including the labyrinth, its irritative effect upon ordinary mucous surfaces and connective tissue is relatively feeble. That being so, it is obvious that lesions in the meninges and in the labyrinth, being more extensive and disorganising, must always *appear* to be older than the relatively slight disturbances in the tympanum, and this even if they were the more recent. Here, to be sure, is a consideration which cannot but weaken the inferences drawn from the microscopic appearances. So much so indeed, that it might conceivably be argued that the opinions based upon microscopic evidence that the meningitis and labyrinthitis are prior in time to the otitis media, are of no value whatever!

It is to be remembered, however, that we are fixing our attention for the moment solely upon the microscopic appearances, and we have suggested that if they stood alone we should be compelled to admit that the arguments in favour of a labyrinth and meningeal invasion from the tympanum were every whit as strong as those in favour of an invasion of the tympanum from the meninges and labyrinth.

But the microscopic appearances do not stand alone. The orthodox view is strongly supported by the clinical phenomena. For, if the invasion commonly followed a route from the middle ear to the meninges, then surely purulent labyrinthitis and deafness would be much more common than they are. Indeed, we should expect, if this were the route always followed, that every case of cerebro-spinal fever would show signs of

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labyrinthitis as one of the first indications of the disease, and we should expect every case to become more or less deaf. Even allowing for a certain number of recoveries from labyrinthitis and deafness, the percentage of patients rendered permanently deaf would almost certainly be higher than it is.

Moreover, we are entitled, I think, to claim that the general rule of the labyrinthitis being bilateral also indicates a meningeal, rather than a naso-pharyngeal, source for the infection. If the meningococcus behaved like a septic organism in coming from the naso-pharynx, unilateral deafness and labyrinthitis would probably be as common as bilateral deafness, if not commoner. (? Is the relative proportion of unilateral to bilateral septic otitis media known?)

### **Summary and Conclusions as to the Route.**

We may now claim to have proved the statement made at the outset of this discussion that the route followed by the meningococcus to reach the meninges is still unknown. We must add, however, that with the exception of the olfactory-cribriform hypothesis, there is something to be said for every one of the other suggestions. The case for each one of them breaks down, it is worth noting, only when the claim is made that this is the route invariably chosen. That being so, may we not ask whether the infection does not pass sometimes in one direction, sometimes in another?

At all events, we have shown enough to indicate how important it is that observers familiar with oto-laryngological work should be given an opportunity of investigating this still unsolved problem. The same point may be made with regard to the

### **Clinical Phenomena of the Aural Complications.**

As to the percentage of cases of cerebro-spinal fever which manifest changes in the ear and hearing the available records are scanty. Alt found 12 out of 41 cases investigated by him to be deaf. Of these 5 died and 7 recovered. Of the 7 recoveries, 4 remained totally deaf, and 3 had partial restoration of hearing. Schotmüller found only 2 cases of deafness in 49 cases, and in 1 of the 2 the deafness was only unilateral. Leczinski out of 50 cases found the hearing affected in 5; these were as follows:—(1) Left-sided permanent deafness appearing on the fifteenth day; (2) bilateral permanent

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total deafness appearing on the first day; (3) bilateral deafness on the right permanent, on the left transitory, noted on the seventh day; (4) appeared on the seventh day; (5) right-sided, appearing on the seventh day.

These cases amount to 140 in all, and the number of deaf patients was 19, approximately 14 per cent. It is known, however, that epidemics vary considerably as regards the incidence of deafness. This is shown when we compare Alt's figures above, 12 out of 41, with Schotmüller's 2 out of 49.

As a rule both ears are affected, although, as Leczinski's cases above show, unilateral deafness is sometimes met with. The relative proportion of unilateral to bilateral deafness is unknown.

The hearing is said to become affected early, usually in the first or second week, rarely later (Moos and Knapp); and in many cases, as in that narrated in our introduction, the deafness is one of the very first symptoms. (This circumstance may be considered as a point in favour of the middle ear route to the meninges.) It is unknown whether the date when the deafness appears has any significance with regard to the prognosis. But absolute deafness may occur in the mildest and even in the abortive forms of cerebro-spinal fever, while, on the other hand, very severe meningitic cases may recover without any loss of hearing whatever (Politzer).

The percentage of deaf cases which recover hearing is unknown. But that recovery even from absolute deafness may occur seems to be admitted. Urbantschitsch, for instance, relates a case in which not only total deafness but also blindness were recovered from. In this connection Hammerschlag expresses what is sure to be a general feeling when he says that if the hearing returns the deafness must have been due to toxic influences, as in the deafness of typhoid fever, and not to purulent labyrinthitis. Nevertheless, Goerke has observed serious disorganisation in the cochlea with new formation of connective tissue and bone in patients who had been able to hear with both ears until death.

With reference to vestibular signs and symptoms, the records, most of which date back fifteen or twenty years, are silent. In J. S. Fraser's case spontaneous nystagmus was noticed during life, but that is the only instance recorded, if we except the "staggering gait" which characterises convalescence from cerebro-spinal fever. This peculiarly delayed symptom of

## Dan M'Kenzie

vestibular disturbance is present, it is said, in from one-half to one-third of all cases; it lasts for several months and is more severe and prolonged in children than in adults. Its cause is unknown. That it is not due to canalicular irritation seems probable from the history of the case described in our introduction, in which, presumably, the canals were destroyed along with and at the same time as the cochlea. Before we can theorise, however, new facts are needed. Obviously it appears when there is no deafness at all. Alt thinks the cause of this Rombergism is labyrinthine; Bárány, cerebellar. I submit that we are not yet in a position to form any opinion.

### Questions of Treatment.

Many of the gaps in our knowledge of the pathogenesis and evolution of cerebro-spinal meningitis might be filled up if the patients were regularly overhauled by oto-laryngologists. It is also possible that the treatment of the disease might in the same way become more frequently successful. Hitherto, as far as I can find, with the single exception of von Stein's case detailed above, there does not seem to be a single instance recorded of any attempt at direct drainage of the meningeal spaces at the base of the brain. Perhaps it would be unsuccessful, perhaps not. The point is that it does not seem to have been tried. Under modern conditions the operation itself would probably be free from risk, and the decompression would at least relieve symptoms, even if it did no more. Admittedly, attempts to drain would probably be useless in the graver cases in which the cerebro-spinal fluid becomes thick and glutinous. But in these cases it must be almost hopeless to expect the antitoxic serum to reach the basal meninges, injected, as it is at present, into the lumbar spine. That being so, the exposure of the dura of the posterior cranial fossa by an experienced otological or brain surgeon, and the injection of the serum here might be tried. For it is to be remembered that the disease, albeit frequently virulent and deadly, nevertheless does show a tendency to spontaneous cure. Little, therefore, may be necessary to tilt the balance in the patient's favour.

# CLINICAL RECORDS

## TEMPORO-SPHENOIDAL ABSCESS IN A BOY AGED SIX

By DOUGLAS GUTHRIE, M.D., F.R.C.S.E., Aural Surgeon, Royal  
Hospital for Sick Children, Edinburgh.

ROBERT S., aged 6, was admitted to hospital on 6th October 1921. His right ear had been discharging for five years, and on four occasions a mastoid abscess had been opened. From the meatus there was a profuse discharge of offensive pus. No earache was present but there had been severe headache for a fortnight, also vomiting three or four times a day. The child was drowsy and showed no interest in anything.

On examination, the right meatus was swollen and contained much fetid pus. The left ear was normal. The boy was dull and listless and still complained constantly of headache. Photophobia was noted. The pupils were equal, moderately dilated. There was no ocular paralysis, no nystagmus, no optic neuritis. Temperature was 97, pulse 60. Just after admission, the patient had a convulsion, affecting all limbs and lasting about twenty minutes.

6.10.21.—Radical mastoid operation was performed in the usual manner. The antrum and tympanum were full of cholesteatoma and very little removal of bone was required to complete operation. No path of infection towards the meninges could be traced, and the dura mater, exposed over an area the size of a shilling, appeared healthy and pulsating.

7.10.21.—Patient still drowsy and cried out because of headache. Vomited once. Photophobia. No localising signs. Pulse 60 to 70. Temperature 97. Lumbar puncture. Cerebro-spinal fluid under tension, clear. No albumen. No organisms.

9.10.21.—As the symptoms continued, a *second operation* was performed. The wound was re-opened and the dura mater punctured with knife. Pus was encountered at depth  $\frac{1}{2}$  inch; a profuse flow of thin, fetid, blood-stained pus. Two ounces were evacuated. A small gauze wick was introduced.

12.10.21.—Headache and photophobia gone, and somnolence less pronounced. Discharge was profuse at each daily dressing.

21.10.21.—No pus coming from abscess cavity. The boy was still drowsy and apathetic, but apparently had a ravenous appetite, and called for food constantly. He tried to pull off bandage, picked at face and head, and did not answer questions.

## Richard Francis

2.11.21.—No pus on dressings. Wound closed by secondary suture.

7.11.21. — Stitches removed. Wound healed. Only a slight mucoid discharge from meatus. Mental condition had much improved during past two days. The boy remembered his name, his teacher's name, etc., and he could now sing nursery rhymes with other children and was, in fact, mentally a normal child.

10.6.22.—The patient has gained weight steadily and his condition, mental and physical, is good for a child of his age. There is no pus or granulation tissue in ear, though the cavity is not quite dry.

### A CASE OF RHINOLITH PRESENTING UNUSUAL FEATURES.

By RICHARD FRANCIS, M.B., Ch.M., Honorary Assistant Surgeon, Ear, Nose and Throat Department, St Vincent's Hospital, Sydney.

H. C. H., male, aged 62 years, carpenter, married, was referred to me by Dr Falkner J. Blaxland, for examination of his nose and throat on 21st November 1921. The patient's only complaint was of failing sight for the last twelve months. Dr Blaxland had diagnosed chronic glaucoma in each eye, but before operating had recommended examination of the nose and throat, as he had noticed a bad odour coming from the patient's nose.

The patient, a well-preserved man, gave a history of "very occasional colds," during which he had noticed that the nasal discharge was at times thick and yellow and had a bad smell. He was also "inclined to be deaf with a cold." The duration of a cold was never prolonged and all symptoms immediately subsided. There was no history of nasal obstruction, headaches, or naso-pharyngeal discharge. There was no loss of smell or taste. No throat symptoms were present.

The family history was good. There had been no previous illnesses. The patient denied venereal infection.

During the examination of the anterior nares on the right side some turgescence of the turbinates was observed. No other abnormality was noted. On the left side a large mass of stony hardness was present, lying in the middle meatus and overhanging the inferior turbinate body, which was partially atrophied. The mass seemed firmly fixed and was covered by a foul-smelling mucoid débris. It was found on palpation that the mass extended continuously in an

## Rhinolith Presenting Unusual Features

antero-posterior direction through the whole nasal cavity, but there was a definite airway between it and the septum; a probe could be passed between it and the lateral nasal wall with difficulty. The mass terminated in a large lobulated end hanging into the nasopharynx. The nasopharynx was otherwise apparently normal.

Transillumination showed impairment of both antra, the left being more affected than the right.

The patient had an artificial denture of the upper jaw. The remaining teeth were very carious and there were some granulations on the posterior pharyngeal wall. No other abnormal condition was noted.

The *membrana tympani* of each ear showed a generalised thickening. Nothing else abnormal was noted in the ears.

He was instructed to have the carious teeth removed. He was sent to St Vincent's Hospital for X-ray examination by Dr Edwards, who reported that a rhinolith was present in the left nasal cavity and that there was dullness of both antra, probably due to a bony change.

On 28th November 1921, at St Vincent's Hospital the maxillary antra were punctured and washed out under cocaine anaesthesia. Both were found to be clear. The rhinolith was then removed. This was done by breaking it into pieces and removing them separately, the large posterior end being pushed posteriorly and expectorated by the patient, as it could not be delivered through the anterior nares. The hæmorrhage was considerable, but was controlled by packing with gauze. The gauze was removed twenty-four hours later, when there was again some oozing. Convalescence was uneventful. An alkaline nasal wash was used for three weeks. Both sides then appeared to be equal on transillumination but slightly impaired.

Portion of the rhinolith was submitted to Dr Utz for microscopical examination. His report is as follows:—

“The specimen submitted for examination was irregular in shape, more or less resembling in appearance a large broad bean. It was from 3.75 centimetres to 5 centimetres (one and a half to two inches) long and about 2.5 centimetres (one inch) wide. It was of stony hardness and did not disintegrate or fracture on being subjected to mild force with a hammer.

“This calcareous mass was decalcified; the remaining tissue was about one-half the size of the original material and was of a fibrinous nature. Sections showed that the tissue consisted of a large amount of fibrin intermingled with blood-clot. Beyond numerous red-blood cells seen on section there were no other cells present. The examination, therefore, would suggest that the rhinolith in question proceeded from a blood-clot in the nasal region which had become calcified.”

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After receiving this report, I asked the patient whether he had suffered from epistaxis. He remembered that in childhood "his nose used to bleed," but not since.

The rhinolith is considerably larger than any previously reported. Text-book references are scanty. De Havilland Hall and Herbert Tilley give the average weight as 4 to 5 grammes (70 to 90 grains). They state that the usual site is the inferior meatus, that the usual nucleus is a foreign body and that their occurrence is more common in females than in males. The rhinolith had evidently been *in situ* for a long period, and it is remarkable that it had not caused any symptoms.

I am greatly indebted to Dr Blaxland for letting me examine the patient, and to Dr Edwards and Dr Utz for their examination and reports.

## SOCIETIES' PROCEEDINGS

### ROYAL SOCIETY OF MEDICINE—SECTION OF OTOTOLOGY

March 17th, 1922.

*President*—Dr A. LOGAN TURNER.

**Cases of Functional Deafness.**—DAN M'KENZIE, M.D.—Whatever hesitation may be felt in placing reliance upon the vestibular reactions in the diagnosis of functional or hysterical deafness, no dubiety can exist when absolute nerve deafness is suddenly recovered from. This absolute test is illustrated in the following cases:—

CASE I.—An old lady complained that she had been stone-deaf for several weeks. Examination bore out her statement: the hearing for the voice and also for the tuning-fork by air and by bone was entirely absent. Both meatuses were blocked with impacted cerumen; this was removed by syringing. The patient said that she could now hear, and, on examination, while there still remained a certain amount of nerve deafness, probably senile, she was able to hear the moderately loud conversational voice. Obviously, the obstructive deafness superimposed upon the slight nerve deafness had induced, by suggestion, a complete loss of all sound perception.

CASE II.—Male, aged 56. Operated on for sessile osteomata occluding both external meatuses and causing deafness, especially



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severe on the left side. On this side, where the meatus was completely blocked, the auricle was reflected forward after a post-aural incision, and the bony meatus was enlarged with gouge and mallet. On the right side, the operation was undertaken without displacing the auricle. Left facial paralysis, which is proving now to be transitory, followed the operation, and the reactionary swelling of both meatal walls led to a continuation of the obstructive deafness. Ten days after the operation the patient suddenly became absolutely deaf to all sound in both ears, without any spontaneous nystagmus, although a little giddiness was complained of. The caloric reactions were negative, but the swollen and occluded meatuses forbade any reliance being placed on this test. In view of all the circumstances, operative and clinical, a diagnosis of functional deafness was made, and a good prognosis hazarded. A month later the patient was able to hear the tuning-fork by bone conduction in both ears, and a few days later the hearing in the right ear suddenly returned "with a crash" which made him stagger. At the present time (six months after operation) the hearing in the right ear is normal, save that loud sounds are felt to be unpleasant. There is still deafness, but only obstructive deafness, in the left ear.

Mr STUART-LOW said he presumed that the osteoma was of the sessile and ivory type and situated far in the meatus on the posterior wall near the membrana tympani. A bony growth of such a character would necessitate very heavy hammering for its removal, and the probability was that the hammering, by giving rise to an effusion into the aqueductus Fallopii, explained the occurrence of the temporary facial paralysis. In order to obviate what he considered very dangerous brain-shaking even in an ordinary mastoid operation, he had invented lead-headed chisels and mallet, the use of which materially lessened such concussion.

Mr VLASTO asked whether the tuning-fork tests in these two cases were conclusive in favour of nerve deafness? When he was in the Navy, he was one day talking in the ward-room when he suddenly noticed he had become very deaf in one ear. He came to town and consulted three surgical colleagues. Mr Cheate diagnosed his case as one of neurosis; there was definite absence of nerve conduction on one side, and he said the tests were not conclusive. The deafness in that ear, with a singing sound, persisted three months. Hearing gradually returned, and it was now normal. If the tests in these cases were not conclusive, the condition might be a neurosis.

Dr M'KENZIE (in reply) said that in regard to the facial paralysis, the conclusion to which he had come, on a review of the case, was that he had probably gone a little astray. It was difficult to locate the facial nerve from the meatal aspect, and especially from a deformed meatus, without the guidance of the antrum. In doing the radical mastoid operation one found the aditus, and knew from it the position of the nerve. But in the meatus, with its curve forward and the shelving forward of the posterior wall, the facial nerve lay further forward and nearer to the chisel than one was apt to

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suppose. He thought that in the future the simplest thing in these cases would be to make an opening into the antrum first, and having thus localised the antrum and the facial nerve, one could estimate when, in the bony meatus, one came into the region of danger. Some time ago he did some measurements on the facial nerve and found that it lay only 2 or 3 mm. behind the posterior wall of the meatus, and a little deviation in an operation on the bony meatus would bring one into the facial canal. The osteoma was of the sessile variety, the whole of the posterior meatal bony wall being advanced; the growth was so near the membrane that the latter was involved. He could not see the membrane before operating, as the meatus was completely occluded.

Dr LOGAN TURNER (President) said he thought that if the facial paralysis was due to effusion into the nerve sheath from the act of chiselling as suggested by Mr Stuart-Low, there would be more cases of facial nerve paralysis after the performance of mastoid operations.

**Case of Extra-dural Abscess, Meningitis and Cerebellar Abscess; Recovery**—E. D. D. DAVIS, F.C.R.S.—E. C., female, aged 26. Admitted on 4th December 1921, with a diagnosis of meningitis and suppuration of the left ear. The left ear had discharged off and on for two years. On 1st December she had severe headache and vomited for ten hours, and became very noisy and restless.

When seen three days later she had attacks of severe left occipital and frontal headache, but answered questions clearly. Temperature 100.8 F., pulse 92, respirations 24. Pupils contracted with normal reactions. No nystagmus. Rigidity of neck, slight tenderness of temporal fossa; no mastoid tenderness. Left ear showed offensive, purulent discharge with granulation tissue in the roof and an attic perforation. Warm irrigation of left ear produced vertigo, but no nystagmus. Hearing: conversational voice, 6 feet; bone conduction normal; Weber to left. Turbid cerebro-spinal fluid reduced Fehling's solution; neutral reaction; numerous pus cells, no organisms.

Left radical mastoid operation. There was foul pus in the lateral sinus groove, and extending forwards between the dura mater and petrous bone to the aqueduct of the vestibule and internal auditory meatus. Lateral sinus covered with granulation tissue, but collapsed on plugging the upper end, and afterwards, when opened, was found to be patent with no thrombosis. The posterior fossa was exposed right up to the labyrinth and facial canal, and as there was a sinus in the roof of the middle ear, a large area of middle fossa dura was exposed. Both areas of dura mater appeared to be normal. The wound was left open with a view to opening the dura mater later.

Patient was relieved. Temperature normal, pulse 88, but on 12th December she complained of severe headache and vomited. Lumbar puncture; clear sterile fluid. Patient drowsy, nystagmus to left, optic discs congested, no œdema. Definite inco-ordination of left hand,

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dysdiadokokinesis, left grasp weaker than right. Left tendo Achillis and knee-jerk increased: later ankle clonus.

Posterior fossa trephined behind lateral sinus, and after repeated exploration some foul-smelling pus, suggesting the presence of *Bacillus coli*, was evacuated. Puncture of the dura in front of the lateral sinus produced no pus. Patient recovered slowly. The pus from the extra-dural abscess and the cerebro-spinal fluid withdrawn 20th December produced pneumococci and *Bacillus proteus*.

Dr LOGAN TURNER (President) asked whether Mr Davis thought the cerebellar abscess was there all the time, the symptoms being masked by the meningitic symptoms. He also inquired why the exhibitor did not in the first instance explore the cerebellum through the area of the bone internal to the sinus rather than behind it. The patient had an extra-dural abscess between the labyrinth and the sinus.

Mr G. J. JENKINS recognised the difficulty of making a complete examination in these conditions. Mr Davis spoke of pus cells being found in the cerebro-spinal fluid; he (Mr Jenkins) supposed that polymorpho-nuclears were meant. This was a very important finding, because in cases of cerebellar abscess in which there was no definite meningitis, he had usually found the cell count showed lymphocytes in greater proportion. He now had a case with 97 per cent. lymphocytes, 3 per cent. plasma cells, and protein in the fluid 0.04 per cent., and no change in the chlorides. In this case the count was that of purulent meningitis—a large pus-cell count. He would like to know the sugar estimate, the proteid content, etc. The case raised a very important point in regard to cerebellar abscess. There were two kinds of abscesses in the posterior fossa: those involving mainly the meninges, and those involving the cerebellum itself. Was the pus in close relation to the anterior wall of the fossa, in relation to the lateral sinus, or in the substance of the cerebellum?

Mr J. F. O'MALLEY said that Mr Davis's case was one of great interest. Did he consider that the route of the infection was directly into the posterior fossa, along the lateral sinus? Or did he think it was translabrynthine? Mr O'Malley thought it probably was not translabrynthine, as the bone conduction was evidently good. In this case, however, there appeared to have been two intracranial complications. At the first operation there were pus cells, and on the second occasion the cerebro-spinal fluid was clear and sterile, and from that, one was inclined to assume that the meningitis was not dependent on the abscess, the latter being probably the antecedent condition, the meningitis being the acute manifestation which brought the patient for advice.

Sir WILLIAM MILLIGAN agreed with Mr O'Malley that the abscess had probably been present all the time, and that it was the lateral sinus condition which brought the patient immediately under observation. In his experience, the majority of cases of cerebellar abscess had a certain amount of meningitis, though it was a question as to what was meant by meningitis. No organisms were found in this case, and it was important to know whether the cells found were pus cells. He did not regard a case as purulent meningitis unless organisms were found in the fluid.

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In the present case there had been much localised irritation, and some lymphocytosis in the theca. He would raise the question whether, in the case of an extensive cerebellar lesion such as this, it was not advisable to make a counter-opening for drainage. When there was a septic process spreading along the petrous to the internal auditory meatus, and the cerebellar abscess was opened through that route, was it not safer to make an opening behind the lateral sinus and do counter-drainage? In many cases drainage was often very imperfect, therefore recently he had carefully followed the counter-drainage plan, and felt sure his results had been better. He did not think it added to the risks. The anatomy of the cerebellum was so peculiar, as also was the way in which the tentorium acted, that drainage of these cases was even more difficult than in the case of cerebral abscess. The result in Mr Davis's case was a surgical triumph. He (Sir William Milligan) had had a very similar case a year ago, but with the addition of an extra-dural abscess, a cerebellar abscess with thrombosis, and also, at any rate clinically, septic "cerebellaritis." For days the patient hovered between life and death, but finally recovered. Much bone was taken away, and counter-drainage was employed; a large cerebellar hernia resulted, which had now disappeared, and the patient's mental condition was now good.

Sir JAMES DUNDAS-GRANT endorsed Sir William Milligan's contention as to the value in these cases of making a counter-opening to secure good drainage. In a case which he showed before the Section many years ago, there was thrombosis of the lateral sinus in which ligature was done, but symptoms of cerebellar abscess soon supervened, the arm on that side becoming quite flaccid. He opened the abscess in front of the sinus, but pus poured out continuously until he made a counter-opening behind it. After that it dried up with extraordinary rapidity, and the patient went through the war as a driver in the Artillery. In the present case the subdural abscess seemed to have originated in the saccus endolymphaticus.

Mr CLEMINSON said the question asked as to why Mr Davis did not explore in front of the lateral sinus, reminded him of an unfortunate experience in the case of a girl upon whom he operated for cerebellar abscess, the dura being opened in front of the lateral sinus by the removal of a triangle of bone. A drachm of pus was in that way evacuated, but the patient almost immediately stopped breathing, though the heart continued to beat. Artificial attempts made for two or three hours to restart respiration failed, although the heart still continued to beat during this time. In trying to find an explanation of this, he had wondered whether the cedema of the opposite side of the cerebellum, when the pus had been evacuated, had pushed the medulla against the edge of the foramen magnum and so interfered with the respiratory tract; and whether, therefore, in a similar case, it might not be wise to do a decompression operation on the opposite side first. At the post-mortem examination nothing more was found.

Mr SMALLEY said he had had a case in which a boy was brought in comatose with a lesion on the right side; evidently he had an intracranial abscess. Ether was given, and he (Mr Smalley) had just begun the operation—no bone had been removed—when the breathing stopped, and for that reason he thought it was a cerebellar abscess. Artificial respiration

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could not be carried on, and he therefore did a rapid operation, so that in five minutes he had opened the cerebellum and let out over an ounce of pus. Breathing then recommenced. The patient lived for three or four days and then died of "cerebellaritis." The stoppage of respiration in that case was due to pressure on the medulla.

Dr LOGAN TURNER (President) referred to the fact that Sir William Milligan some years ago drew his attention to the value of doing lumbar puncture when confronted with such difficulties as had just been alluded to. When breathing ceased, lumbar puncture could be done more quickly than the completion of the cerebellar operation.

Mr E. D. DAVIS (in reply) said he did not know why this patient recovered, unless it was because it was a pneumococcal and not a more virulent streptococcal infection. There was a perisinus abscess which tracked forwards to the internal auditory meatus. The wall of the sinus was covered with granulation tissue and the cerebellar abscess was discovered near the bulb of the lateral sinus. He believed that infection arose from the perisinus abscess and not through the labyrinth, because the hearing of the affected ear was good, and warm irrigation produced vertigo but no nystagmus. At the time of the first operation there was no clinical sign of cerebellar abscess, and the neurologist, Dr Adie, at his second examination, eight days after the first operation, discovered definite signs of a posterior fossa or cerebellar abscess. He (Mr Davis) said it was presumed that the abscess had developed later and was not present at the time of the first operation. The dura was punctured and explored in front of the lateral sinus with a negative result, but repeated exploration through a large opening in the posterior fossa behind the lateral sinus produced a quantity of foul pus. The posterior fossa was opened behind the lateral sinus, because a more thorough exposure of the brain was obtained and, in a case where the diagnosis was doubtful, exploration and access were much easier. In his experience, the cerebro-spinal fluid of obvious cases of meningitis confirmed by autopsies was frequently sterile and contained no organisms in spite of the presence of pus.

## **Lateral Sinus Suppuration, with an Unusual History—**

NORMAN PATTERSON, F.R.C.S.—Boy, aged 11. Admitted 23rd November 1921, with a history of watery discharge from the left ear since 9th September 1921.

Left tympanic membrane inflamed, Shrapnell's membrane bulging and small perforation in attic region; auricle projecting and slight tenderness over mastoid. Incomplete mastoidectomy by Mr W. Morris. Pus found in mastoid cells.

Re-admitted 16th January 1922. History of a swinging temperature for a fortnight, but no rigors.

Tympanic membranes and mastoid region normal. A very tender spot, size of a sixpence, was situated over the lateral sinus, 2 inches behind left external auditory meatus. Left wrist-joint painful on movement, and slightly swollen. Widal reaction negative.

Operation by exhibitor. Mastoid opened up, healthy; sinus

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exposed, pink in colour; followed backwards as far as the tender area, previously mapped out with chisel. Sinus was opened in usual position and contained dark blood-clot. Clot followed backwards. Exactly opposite the tender area sinus contained about half a drachm of pus. Clot, which extended backwards nearly to the torcular, was cleared out until free hæmorrhage occurred from the proximal end. Internal jugular ligatured in neck. Temperature remained irregular until 1st February. Boy made a good recovery.

Examination of the pus showed streptococci to be present. The case seemed to be a very unusual one, in that an abscess had formed in the sinus at a great distance from the mastoid cells.

**Very Extensive Infection of Lateral Sinus and Jugular Vein, followed by Recovery**—NORMAN PATTERSON, F.R.C.S.—Girl, aged 17. With right otorrhœa since scarlet fever six years previously. Admitted 19th November 1921, suffering frontal headache, vomiting, rigors, and constipation.

On examination: dull, speech slow, sleeps most of the time; headache mostly occipital; marked deafness in the right ear; several rigors. Lateral sinus exposed, and pus evacuated; abscess extended nearly as far as the torcular; free bleeding obtained from this end of sinus. Internal jugular exposed in neck and found thrombosed. Attempt made to get below the clot by dividing lower attachment of sternomastoid, but found impossible. Ligature passed round vein at lowest possible point, but here clot was present. The patient, however, made an excellent recovery. Streptococci in the pus.

Mr G. J. JENKINS, referring to the first case, said he had seen more of these quiet infective cases in the last two or three years than in the rest of his experience. In a recent almost identical case he advised that the patient should be kept under observation. There had been slight discharge from the ear, but when examined the tympanic membrane had healed. Mr Cheate operated, and found the lateral sinus was thrombosed, with an extensive abscess formation in the sinus. The patient recovered. It reminded him (Mr Jenkins) of three or four cases he had seen of healing in the middle ear, with the infection persisting in some other part, causing abscess. One patient he saw with acute middle ear trouble in May, ear trouble again in August, and a further occurrence in September, and again it healed. The patient had never been quite comfortable, but always had dull, occipital pain. He explored in October and found the air cells normal and the mastoid healthy, but there was an extra-dural abscess and the lateral sinus was in relation to it. In regard to the case of infection of the lateral sinus and jugular vein, the lesion was very extensive, and reminded him of a similar case which had been in the hands of the physicians for two or three days. The patient had lateral sinus thrombosis, the sinus being affected in the lower part. The internal jugular was involved to the junction of the great vein in the thorax. In the middle of the neck no

# Pharynx and Nasopharynx

jugular vein could be found, but there was an abscess in the place of the internal jugular. At the time of the operation the patient had residual abscesses, one in the forehead, another in the arm. Streptococcus was found. There was complete recovery. He thought it did not matter what the particular organism was; what did matter was, what was the resistance of the patient to the bacterial infection?

Mr STUART-LOW said that it was pretty well agreed that cases such as these were almost always post-influenzal, and that there was in influenza a great tendency to the formation of clots in the blood-vessels owing to profound changes in the blood. He had often found it very helpful to give quinine for at any rate forty-eight hours before operating, and in at least two cases recently the patient had recovered without operation, the clots having resolved.

Dr LOGAN TURNER (President) said that the results in Mr Patterson's cases were excellent. Did he ligature the internal jugular in all his cases? Its necessity in the second case was obvious, but was there any bleeding from the lower end in the first case?

Mr NORMAN PATTERSON replied that there was no bleeding at the lower end of the sinus in the first case, and he fully expected to find a thrombus in the jugular. In answer to Mr Stuart-Low, he feared that if he had relied on quinine for the treatment of these patients, they would not have been here to-day.

## ABSTRACTS

### PHARYNX AND NASOPHARYNX

*The Treatment of Peri-tonsillar Abscess.* LEVINGER (Munich).  
(*Archiv. für. Laryngol.*, Band 34, Heft 1, p. 155.)

The writer recommends at any stage his operation of extra-capsular enucleation of the upper pole of the tonsil under local anæsthesia (2 per cent. novocain with adrenalin), as described by him in 1914 (*Münch. Med. Woch.*, No. 23) and in 1919 (*ibid.*, No. 12). He postulates for the operation in the early stage with a thorough command of the technique. One advantage of this method of treatment is that it affords protection from recurrence. JAMES DUNDAS-GRANT.

*Clinical Reflexions on Peri-tonsillar Abscess.* DR CANUYT, Strasbourg.  
(*L'Oto-Rhino-Laryngologie Internationale*, January 1922.)

The writer emphasises the following points regarding this condition. He quotes the case of the peri-tonsillar abscess left to mature. Suddenly the temperature and pulse rise, and the patient presents the classical signs of phlebitis of the cavernous sinus. The patient,

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of course, is beyond the reach of any help, and death may be attributed to refusal to incise earlier. For this reason, early incision is insisted upon, and the following technique is suggested. Preparation of the point of incision by Bonair's drops, and the opening of the abscess by the punch forceps of Lubet-Barbon. This instrument is blunt-nosed and the arms can be separated sufficiently to provide adequate drainage. The cause of the abscess must also be ascertained, septic tonsils, adenoids, sinusitis, or the extension of a periostitis from an erupting wisdom tooth.

A course of certain mineral waters, after surgical intervention, is recommended, the writer placing considerable reliance on their local effect.

GAVIN YOUNG.

*Some Remote Effects of Tonsillitis.* A. B. PAVEY-SMITH, M.C.,  
M.B., F.R.C.S. (*Practitioner*, April 1922.)

The author excludes any reference to the hypertrophied tonsils of children, and deals with the tonsil as an infective focus. The tonsillar condition is not necessarily acute or even obvious, but "includes an infected state, usually chronic, often latent, seldom a symptom, frequently only an unrecognised sign." From some forgotten tonsillar inflammation, crypts remain infected, and "a smouldering inflammatory process goes on in their depths." Partial removal of the tonsil may be the original cause, the divided crypts becoming closed by scar tissue.

This may cause such diseases as endocarditis, pericarditis, fibrositis, toxic neuritis and appendicitis. The writer deals mainly with the tonsil as a focus in arthritis.

An excellent historical review is given of the experimental and clinical evidence which has been adduced to prove the rôle of the tonsil in the production of arthritis. As to diagnosis, the history of sore throat, and the size of the tonsils are alike misleading: redness, however, if limited to the tonsil and its immediate surroundings, is a more reliable sign, and in some cases there is only a vertical red streak or minute dilated vessels on the anterior pillar. The tonsil should be squeezed between two spatulæ to examine the condition of the crypts—with a good light—fluid pus can often be seen expressed from a tonsil which at first sight appeared comparatively healthy. If bleeding occurs, the author takes this as evidence of granulations in the crypts; enlargement of the tonsillar gland is definite evidence of infection.

A caution is given against accepting the tonsil as *the* focus when it may be only *a* focus; the teeth, middle ear, and nasal accessory sinuses should also be examined.

As to treatment, only complete enucleation should be considered, and the author holds that this may be indicated even in cases where



## Pharynx and Nasopharynx

a focus cannot be found after the most complete examination "because it has been proved that the tonsil, more than any other known focus, can be deeply infected and yet present a perfectly normal appearance."

T. RITCHIE RODGER.

*Aluminium Throat Swabs.* LACHLAN GRANT. (*Brit. Med. Journ.*, 18th March 1922.)

The writer draws attention to the drawbacks attached to the use of copper, iron, steel, or thin nickel wire in connection with sterilised throat swabs. These metals are easily tarnished and become discoloured and unattractive for the purpose for which they are employed. The attached pledget of wool is also likely to become stained.

Aluminium wire, on the other hand, keeps bright and clean. It can be easily moulded and yet is sufficiently rigid for swabbing purposes. It stands boiling and in its composition it contains no harmful bactericidal elements, as may be the case with copper and nickel.

A. LOGAN TURNER.

*A Case of Lingual Goitre.* G. DIDIER. (*L'Oto-Rhino-Laryngologie Internationale*, January 1922.)

A woman of 49 complained of irritation in the throat, causing continual coughing. The patient presented the appearance of myxœdema, and had been treated for the previous fifteen years with thyroid. Swallowing was difficult, solid food causing pain. The dorsal decubitus always brought on coughing.

Examination revealed the fact that the thyroid gland was absent from its normal place. Indirect laryngoscopy showed a tumour at the base of the tongue, round, symmetrical, and in the middle line, which filled the isthmus of the pharynx and hid the vestibule of the larynx. The swelling was soft but non-fluctuant.

The absence of the thyroid gland from its normal place and the appearance of this swelling suggested lingual goitre. The differential diagnosis is gone into, regarding simple tumour, gumma, and tuberculoma. The reporter deprecates surgical intervention, and states that since his first examination, there has been no increase in the size of the tumour.

GAVIN YOUNG.

*The End-Results of Removal of Tonsils and Adenoids.* HAROLD S. SINGTON, M.D., M.R.C.S. (*Brit. Med. Journ.*, 4th March 1922.)

This is an interesting contribution to the subject, from the viewpoint of the general practitioner who, as the author says, "is naturally in the best position to judge the end-results, since he is able to observe the patients more intimately and for longer periods than the operator." His statistics include the number of attendances required by the child

## Abstracts

before operation, and the number afterwards, and he reaches the conclusion that "once convalescence after the operation is complete, the child's health is so greatly improved that one has hardly ever had to attend him or her again."

Of the 52 cases cited, 47 per cent. required no further attendance; 9 per cent. were attended to for intestinal disorders; 7.5 per cent. for congenital deformity; 7.5 per cent. for zymotic diseases; 4 per cent. for appendicitis, and 19 per cent. for other disturbances unconnected with the throat.

All the cases included are children whom the writer has been able to keep trace of, as being the family medical attendant.

T. RITCHIE RODGER.

*Ocular Complication following on the Removal of Adenoids.* FIOCRE, (*L'Oto-Rhino-Laryngologie Internationale*, December 1921.)

A youth of 18 was operated upon for the removal of adenoids. The operation was uneventful. Two days after the operation, however, the patient complained of pain in the left lower eyelid, which was followed on the next day by œdema and tenderness to pressure in both eyelids on the same side. The fundus and vision were found to be normal, and from the fifth day after operation improvement commenced until on the ninth day after operation recovery was complete.

The reporter suggests that the condition was emphysema following on damage to the sphenoidal or posterior ethmoidal cells, which was fortunately unaccompanied by sepsis.

GAVIN YOUNG.

*Malignant Disease of the Throat.* W. S. SYME, Glasgow. (*Journal of the Canadian Medical Association*, December 1921.)

The lines followed, regarding the etiology of malignant disease of the throat, are those laid down by Logan Turner—the disease affects the oro-pharynx (tongue and fauces included), in the proportion of five males to one female; in the laryngo-pharynx, five females to one male; in the larynx, five males to one female. No definite reason has been accepted for this distribution, although many theories have been advanced. The age incidence shows that women are affected at an earlier age than men, the average age for the laryngo-pharynx being 45 in females, 57 in males. The age is higher in laryngeal, than in pharyngeal malignant disease.

The symptoms exhibited vary with the site of the disease. Hoarseness, or difficulty in swallowing, enduring for any length of time, should at once give occasion for expert examination. Indirect laryngoscopy may disclose the presence of a growth, but does not usually show its extent. The condition of the cords, with regard to

## Pharynx and Nasopharynx

mobility, may also be noted, and inferences drawn from fixation or paralysis. Direct examination, however, is essential to correct diagnosis and treatment. The suspension method, by pressing forwards the tongue and epiglottis, brings the larynx and hypopharynx into direct alignment with the observer's eye, and the extent of the growth may be determined and a piece excised for examination. Syme finds this method very satisfactory. The endoscopic tubes may be a valuable aid in determining the extent downwards of the growth. X-ray examination of a bismuth or barium meal may also be utilised to ascertain the spread of the disease. The presence of glands should be carefully sought for.

Regarding treatment by operation, the aim of the surgeon is to extirpate the growth, and yet to retain the continuity of the food and air passages. Operation for intrinsic cancer of the larynx has established itself by its success. In malignant disease of the pharynx the situation becomes more complicated. In the suitable case for laryngectomy, the disease must not have extended into the food passages, and it must be possible to divide the trachea below the growth, and yet leave enough windpipe to bring forward to attach to the skin. In this operation, Syme exposes the larynx and trachea fully, dividing the isthmus of the thyroid gland. The trachea is separated off from the œsophagus and cut across as far as possible from the growth. The upper end is now separated off and removed, and the tissues sutured over the pharynx, a tube having been passed through the nose into the stomach. To remove the pharynx in addition, after the trachea is divided, the œsophagus is clamped and divided, and the lower end passed forward and sutured to the skin. Much good work has been done by Trotter of London in the matter of preserving the continuity of the food and air passages, by the ingenious use of skin flaps. Syme quotes a case of his own in which laryngectomy was performed. Nearly four years later the man had no recurrence, had a very good pharyngeal voice and was actually able to smoke. Syme admits, however, that the majority of these cases do not end well, the condition being very far advanced, of course, before coming to the necessity for this type of operation.

He concludes by pleading for the earlier recognition of the disease by the general practitioner, and the immediate reference of doubtful cases to the laryngologist.

GAVIN YOUNG.

<sup>10</sup> *Diathermy in Malignant Disease of the Mouth and Fauces.* W. J. HARRISON, M.B., M.R.C.S. (*Practitioner*, May 1922.)

The advantages of diathermy over excision by the knife are detailed—freedom from shock, diminution of hæmorrhage, lessened deformity, and more speedy return to normal habits. It is claimed

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that the remarkable amelioration of symptoms in cases sent to the diathermist only because they are much too far advanced for surgical treatment, and the apparent cures lasting over long periods, of cases moderately advanced, justify a more routine use of this method of treatment in early cases.

T. RITCHIE RODGER.

### MISCELLANEOUS.

*A Departure in Hospitals: the National Hospital for Speech Disorders.*

JAMES SONNETT GREEN, M.D., New York. (*Journ. Amer. Med. Assoc.*, 26th November 1921, Vol. lxxvii., No. 22.)

Dr Green is the director of the work at the clinic of this Hospital, which was founded about three years ago. It was formed in order that some systematised effort might be made to intelligently care for those who, from whatever cause, had defective speech. So far, over 3000 people have applied for treatment, and of these 1500 were stutterers. The paper deals very thoroughly with the subject and seeks to justify the placing of such cases in the hands of competently trained medical men, and advocates the founding of similar institutions in other large centres.

PERRY GOLDSMITH.

*The Borderline of Rhinology, Neurology, and Ophthalmology.* GREENFIELD SLUDER, M.D., St Louis. (*Journ. Amer. Med. Assoc.*, Vol. lxxvii., No. 9, 27th August 1921.)

This paper is not suitable for abstracting, and loses much in an endeavour to do so. The writer discusses lower half headaches (Sluder's Neuralgia), choked disk, and injection of the nasal ganglion, which he has done over a thousand times. While agreeing that Cushing's paper, referring to the unnecessary nasal operations performed on cases in which the disease was intracranial, is true and timely, he cites cases in his own practice in which decompression has been performed for head pains which were promptly relieved by operation on the sphenoidal sinus.

PERRY GOLDSMITH.

*Harmful Surgical Intervention in Tuberculosis.* F. CHAVANNE.  
(*Oto-Rhino-Laryngologie Internationale*, July 1921.)

1. *In active tuberculosis.*—The influence of traumatism in the mechanism of auto-inoculation in the case of this disease seems to be in danger of being forgotten. No operation on the nose, throat, or ear should be performed on a patient suffering from tuberculosis, or even on one who is in a state of apparent cure from this disease. The writer instances the case of a student with a quiescent tubercular focus in his right lung, who underwent the operation of submucous

## Miscellaneous

resection of the nasal septum. Immediately after the operation, the other lung became infected, and the patient died three months later.

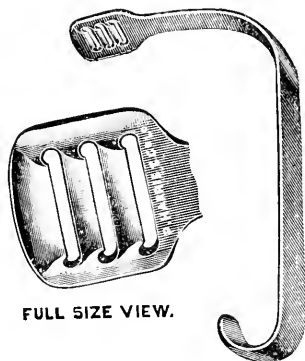
2. *In those predisposed to tuberculosis.*—The same abstention should be practised in the case of patients with the tubercular diathesis. It is impossible, however, to refuse to the children of tubercular parents the advantages of free air-passages, a normal nose and throat being the best prophylactic for tuberculosis.

GAVIN YOUNG.

### TONGUE SPATULA.

B. SEYMOUR JONES, F.R.C.S., Hon. Surgeon, Ear and Throat Hospital, Birmingham.

The spatula illustrated has been designed to afford a better grip of the tongue than the usual pattern. It has been found extremely useful in steadying the tongue whilst cauterising lymphoid follicles on the pharyngeal



wall, for examining the beds of tonsils after dissection, and for operating for quinsy.

In addition to the inclined slats it has a flange at the edge to prevent lateral slipping.

The instrument is made by Messrs Philip Harris & Co., Edmund Street, Birmingham.

## GENERAL NOTES

The Semon Lecture, University of London, was delivered on 12th July, in the Hall of the Royal Society of Medicine, 1 Wimpole Street, by Professor H. S. Birkett, C.B., M.D., Dean of the Faculty of Medicine, McGill University, Montreal. The subject of the Lecture was "The Development of Trans-Atlantic Rhino-Laryngology." We hope to publish an abstract of the Lecture in an early number of the *Journal*.

## General Notes

Drs Halphen and Rouget were appointed "Oto-rhino-laryngologistes des Hôpitaux" at the recent Election in Paris.

\* \* \*

Professor Dr Carl von Eicken has been called from Giessen to Berlin to succeed the late Professor Gustav Killian in the Chair of Laryngology. We understand that Professor von Eicken will be required to teach otology as well as rhinology and laryngology.

\* \* \*

The *Internationales Centralblatt für Laryngologie, Rhinologie und Verwandte Wissenschaften*, which was founded in 1884 by the late Sir Felix Semon, has ceased publication under the above title and now appears as the *Centralblatt für Hals-Nasen und Ohren-heilkunde*. Dr Georg Finder, who succeeded Sir Felix Semon in 1908 as editor, continues to act in the same capacity. The journal has become the organ of the German Society of Physicians for Diseases of the Throat, Nose, and Ear.

\* \* \*

Another well-known journal, the *Archiv für Laryngologie und Rhinologie*, founded by Professor B. Fränkel, has changed its title and now appears as the *Zeitschrift für Hals-Nasen und Ohren-heilkunde*. The new journal is a continuation of Fränkel's *Archiv* in combination with the *Zeitschrift für Ohrenheilkunde und für die Krankheiten der Luftwege*, founded by Knapp and Moos. The new *Zeitschrift* is edited by Professor von Eicken and Dr Georg Finder of Berlin, and by Professor K. Wittmaack of Jena.

\* \* \*

In the 15th Annual Report of the King Edward VII. Sanatorium, Midhurst, recently published, Sir St Clair Thomson reports briefly on the Throat Department. Of 269 patients discharged during the year ending 30th June 1921, 263 were examined laryngoscopically. Of these, 217, *i.e.* 82 per cent., were found to have a normal larynx, and 46, or 17 per cent., showed evidence of disease. Tubercle bacilli were found in the sputum of all the cases suffering from laryngeal disease.

Following the Turban-Gerhardt classification, which indicates the clinical condition of the patients on admission to the Sanatorium, we find that 92 patients who were placed in Group I., where the lung disease is of slight severity and limited to small areas of one lobe on either side, had no evidence of laryngeal disease. Of 78 patients classified in Group II., where the lung disease is of slight severity but more extensive than in Group I., and affecting, at most, the whole of one lobe, or severe disease extending at most to the half of one lobe, 16, or 20 per cent., had a laryngeal affection. Of 94 patients in Group III., *i.e.* cases of greater severity than Group II., and all those with considerable cavities, 30, or 31 per cent., showed signs of laryngeal mischief.

Of the total 46 cases with tuberculosis of the larynx, 9 were cured and 14 were improved, while in 20 the disease remained stationary or became worse. Three died in the sanatorium.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## DENTAL (PERIODONTAL) CYSTS FROM A RHINOLOGICAL STANDPOINT

By A. BROWN KELLY, M.D., D.Sc., Victoria Infirmary, Glasgow.

THREE varieties of cysts arise in connection with the teeth, viz., periodontal cysts, dentigerous cysts, and multilocular cystomas. Although the term dental cyst is applicable to all three, it is most often used synonymously with periodontal cysts because these are by far the commonest.

### Periodontal and Dentigerous Cysts Contrasted.

The periodontal cyst, with which alone this paper is concerned, originates from the periodontium or periosteum of the root of a diseased tooth, and develops outside the tooth, hence the terms periodontal, periosteal, root or paradental, by which this variety is distinguished. In the second class, the cyst arises owing to disturbance in the follicle prior to the eruption of the tooth, and in consequence has been designated a follicular or dentigerous cyst. The periodontal cyst originates only from a diseased tooth, it is thus commonest after dentition is ended, and it never contains the root from which it grew unless this is driven into it, as may occur during an attempted extraction. The dentigerous cyst, on the other hand, is the product of an error in development and has nothing to do with dental caries; it is met with most often during the second dentition, and it usually contains one or more teeth or rudiments of teeth. An idea may be gained of the relative frequency of these two varieties of dental cysts from Partsch's statistics according to which in ten years he had about 200 periodontal cysts and only 6 dentigerous cysts. Oppikofer reports that

## A. Brown Kelly

over a period of fourteen years, 20 dental cysts, one being a follicular cyst, were operated on in the Oto-Laryngological Clinic in Basle. Between 1894 and 1910, Gerber had one follicular cyst and 44 periosteal cysts.

The multilocular cystoma is very rare.

**Frequency.**—Opportunities of observing the early development of periodontal cysts fall to the dental surgeon. In extracting a septic tooth of the permanent set, he often brings away a small fleshy mass, a granuloma, attached to the root (Fig. 1). J. G. Turner recently stated that "the fully developed dental cyst is probably the commonest tumour of the body, the small undiagnosable cyst is many times more common—at a venture, fifty times, while the earliest stage of all (*i.e.* the granuloma) is practically as common as septic teeth."

**Development and Growth.**—The course of events leading to the development of a cyst is briefly as follows: dental caries causing gangrene of the pulp; the passage of bacteria or their products from the pulp through the apical foramen into the tissue of the alveolar ligament; the proliferation of the periodontium and of rudimentary epithelium situated beneath it; the formation of lumina in the latter and their coalescence to form the cavity of the cyst. At this early period the fluid contents may resemble pus and the cyst may be termed an abscess sac.

If a cyst, however small, has once formed, it can go on developing independently of the tooth from which it originated. The tooth may be extracted, but the cyst, if unruptured, will continue to enlarge. The presence of a cyst in an edentulous jaw or behind healthy teeth is thus explained. The latter condition is illustrated in Fig. 2. The specimen depicted was obtained and prepared by Mr J. Mason Noble. The cyst is growing between the fangs of the 2nd molar, and at first glance appears to have originated from this tooth. It springs, however, from an undeveloped wisdom tooth, the decayed root of which is seen projecting at the side.

When the cyst has attained a size to give it clinical importance it has a fibrous wall and epithelial lining, and contains a light yellow translucent fluid in which cholesterol crystals are suspended. The fluid is formed by the breaking down of the epithelium lining the sac, and it is in this manner that the cyst grows. The contents become purulent only in consequence of infection.



# Dental Cysts from Rhinological Standpoint

**The Superior Maxilla the Usual Site.**—The great majority of periodontal cysts are found in the upper jaw. Jacques has operated on over 100 cysts, not one of which was in the mandible. Of Oppikofer's 20 cases, one occurred in the lower jaw. Of Gerber's 45 cases collated by Bautze, all were in the upper jaw. In only one of the writer's 45 cases was the cyst in the mandible; from the same patient he had removed a cyst of the upper jaw thirteen years previously. The rarity of dental cysts in the lower jaw and their relative frequency in the upper are probably due to the difference in density of the enveloping bone in the two situations.

**Teeth of Origin.**—A cyst may grow from any septic tooth; this is seldom a milk tooth, probably because the temporary teeth are short-lived. Of the permanent set, the 1st molar, premolars, lateral incisor, and canine are the commonest starting points. When the cyst is large and the jaw edentulous, it is often impossible to determine the tooth of origin. Even by means of X-ray and post-mortem examination it can be made out, according to Rosenstein, in only one-third of all cases.

## Types of Periodontal Cysts.

The direction in which a cyst grows depends mainly upon the tooth from which it originates and the thickness of the surrounding bone. Some of the varieties met with may be briefly referred to. The smallest often line a domed, smooth-walled cavity in the substance of the alveolus; such are usually discovered at the extraction of the tooth of origin, or by a discharge of pus at the side of a tooth or from a fistula in the gum. When larger or more superficial, they may produce bulging or erosion of the facial wall, or, having reached the facial surface while still small, their subsequent growth may take place here (Fig. 3). These are the earliest stages at which a cyst is commonly diagnosed, it being then appreciable on palpation and inspection. Parchment-like crackling may be elicited if the overlying bone is reduced to a thin resilient shell; this classical sign is not always present. When the bone has been absorbed over an extensive area, the cyst wall lies beneath the mucous membrane of the gingivo-labial fold, which if stretched may assume a bluish aspect and yield fluctuation. On the other hand, if only a small portion of

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the wall of the sac is exposed it may escape detection, unless the finger is carried firmly along the alveolus and the parts immediately above.

If there is doubt as to the nature of the bulging or swelling an exploratory incision may be made. In the case of a non-infected cyst the contents vary from a thin, faintly-tinted translucent fluid to a pultaceous or even solid material of a dark brown colour, with an admixture of cholesterin crystals. On probing, the sac is found closed, and on syringing, the fluid returns. Information as to the size and anatomical relations of a cyst can be obtained by filling it with bismuth or wire and examining with X-rays.

A cyst which continues to increase beyond medium size may travel along the alveolus and cause absorption of the bone overlying adjacent teeth, so that these may project into the sac. In this way the cusp of a tooth left in the gum may be invaginated into the sac and ultimately come to lie loose within it. A tooth found in a cyst is usually to be accounted for thus, and it is almost never the tooth from which the cyst developed. The sac may go on enlarging in other directions so as to penetrate and distend the antrum, depress and perforate the hard palate, raise the floor of the nose, and even cross the middle line. Such large dimensions, however, are rarely attained nowadays. Two special types in which the antrum and the nose are invaded respectively, call for further consideration.

### Dental Cysts in the Antrum.

When the cyst originates beneath the floor of the antrum, it may grow into this cavity and enlarge until it has almost or completely filled it. Bulging or erosion of one or more of the walls will be produced sooner or later by progressive increase in the size of the cyst. Dental cysts invading the antrum may thus be divided into two classes or stages of development, viz., those in which bulging of one or more of the antral walls has taken place, and those with no external sign. The former may be referred to as—Dento-antral cysts with distension, and the latter as—Latent dento-antral cysts.

**A. Dento-antral Cysts with Distension.**—Excellent descriptions of the signs and symptoms of large dental cysts which distended the antrum are to be found in some of the surgical works published forty or fifty years ago. The

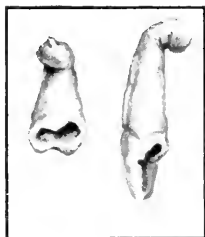


FIG. 1.



FIG. 2.



FIG. 3.

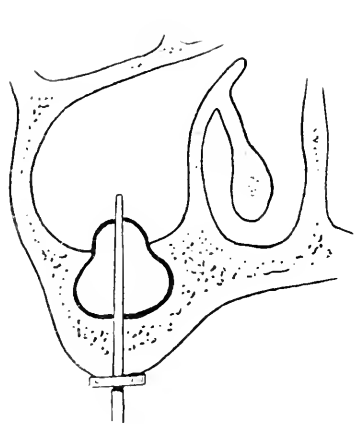


FIG. 4.

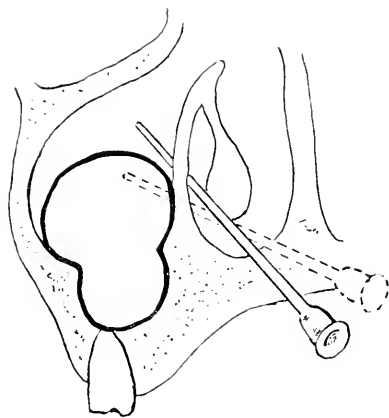


FIG. 5.

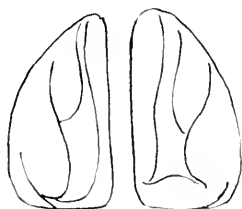


FIG. 6.

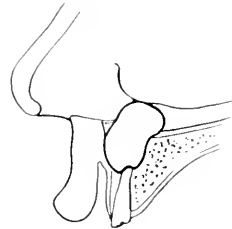
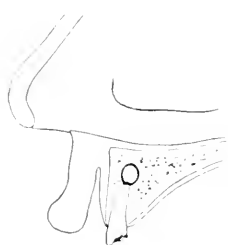


FIG. 7.

## Dental Cysts from Rhinological Standpoint

designations used indicate the views then held as to the pathology of such cases, *e.g.*, distension of the maxillary sinus by fluids or mucous cysts, *hydrops antri Highmori*, abscess of the antrum with blocked ostium maxillare. Even in 1894, Heath in the fourth edition of his *Jacksonian Prize Essay on "Injuries and Diseases of the Jaws,"* divides cases of *empyema antri* into two classes—one in which there is a free exit for pus into the nose, and another in which the ostium maxillare has become blocked. In the latter class, the bottled-up pus is supposed to distend the antrum, cause partial absorption of the walls, bulge out the cheek and thrust up the floor of the orbit. To illustrate the condition he reproduces a figure from Sir William Fergusson's work on Surgery. He also mentions the peculiar crackling elicited by pressing on the bone and states that if the matter is not evacuated it will find a way for itself and that considerable necrosis and scarring are likely to result. This description is not applicable to any phase of suppuration in the antrum, but corresponds with the course of development of a large dental cyst which has invaded and distended the antrum. The distension used to be erroneously attributed to blocking of the ostium, because nothing escaped by it on syringing through a fistula or incision leading into the cyst. In the non-purulent variety of the same condition, sometimes termed *hydrops antri Highmori*, cystic degeneration of the mucous glands of the antral lining membrane was assumed to be the source of the distending fluid. It is now known that these delicate cysts, which are usually multiple and by no means rare, are incapable of producing this effect.

The teaching as to distension of the antrum in consequence of blocking of the ostium was long in vogue. It is probably on this account that only in recent years rhinologists have been recognising a fair number of dental cysts, while their anomalous cases of "antral suppuration" have been getting correspondingly fewer.

The conditions referred to below are examples of those anomalous conditions formerly attributed to antral suppuration but which, especially when several co-exist, should raise the suspicion of a dental cyst:—A purulent nasal discharge which lasts a week or two and recurs at long intervals; transillumination which is less bright than normal, but not dark enough to signify moderate suppuration; exploratory washing from the nose which in the same patient is sometimes positive, sometimes

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negative, and occasionally impossible owing to inability to force the fluid through; the return of fluid injected through an opening bored in the alveolus, or its slow and difficult passage into the nose. In one of the writer's cases, fluid syringed through the gum came from the nose clean or almost so, but on withdrawing the cannula pus flowed from the opening into the mouth. The explanation of this peculiar experience was that the cannula had traversed a cyst and that the healthy antrum was being washed out instead of the purulent contents of the cyst (Fig. 4). When pus issues from below the inferior turbinate and is traced to an opening in the naso-antral wall, it should be remembered that a dental cyst filling the antrum may burst into the nose in this situation. (Hajek, Perthes.)

**B. Latent Dento-antral Cysts.**—The subject of the invasion of the antrum by dental cysts which do not betray their presence by external bulging has received little or no attention in text-books on diseases of the nose and its accessory sinuses. The somewhat detailed description given below of the course, signs and diagnosis of such cases may therefore prove helpful.

When a dental cyst invades the antrum and does not show externally, no signs will be produced as long as it is closed. If, however, in the course of an acute nasal catarrh it becomes rapidly distended and bursts, the patient will have a sudden discharge from the corresponding nostril. The discharge is usually of a pale yellow or almost colourless translucent fluid if the cyst is not infected; otherwise it is purulent; and in either case there is likely to be a tinge of blood. When the inflammation in the antrum subsides the non-infected sac may close and remain so until it again ruptures owing to fresh cold. A purulent discharge from the cyst is more liable to persist, but that may diminish, after a varying interval, so as to allow of at least temporary closure of the sac.

A clinical history corresponding with the course of the events outlined is not very uncommon. The patient generally states that when engaged, with his head down, fluid suddenly runs from one nostril without any warning. He may have a cold in the head, but, as a rule, there is no pain or other symptom to direct attention to the antrum. He is likely to have experienced the sudden flow of "water" or of matter on several occasions before he consults a doctor. This may have taken place at intervals of months or years. At the onset

## Dental Cysts from Rhinological Standpoint

of each attack the first "gush" is copious and tinged with blood. When watery, cholesterin crystals should be looked for; the presence of these almost certainly establishes the diagnosis of cyst. If, when purulent, an admixture of mucus is detected, the latter cannot come from a cyst but must be contributed by the antral lining membrane. The watery discharge may not be noticed after the first day; pus, however, is likely to be observed for several days but coming in quite small amount and without the periodicity of an antral suppuration. When a cyst bursts into the antrum a cycle of events may thus be observed, viz., sudden copious discharge, rapid diminution, gradual cessation and period of quiescence. It is not possible to get ocular proof of the changes undergone by an inflamed dental cyst in the antrum, but the description given is in conformity with the clinical history of cases of this nature as well as with the changes frequently observed in cysts projecting on the surface of the maxilla, and with the behaviour of cysts in other parts of the body.

The course of two antral affections, viz., acute catarrh with closure of the ostium, and acute empyema, may closely resemble the rupture of a serous and purulent cyst respectively. The antral affections are accompanied by pain in the cheek, which may be acute, may last for several days, and begin to subside only after the pent-up liquid escapes. If before this takes place proof puncture is done, the antral contents will at first drop from the cannula, and if syringing the antrum is impossible owing to swelling at the ostium it often succeeds after painting the infundibulum with adrenalin. The discharge in acute antral catarrh is commonly of a canary yellow colour; in empyema the pus is likely to be mixed with mucus.

If the presence of a latent dento-antral cyst is suspected owing to an occasional discharge from the nose, the diagnosis may be very difficult. When the sac is small, transillumination often helps by revealing a dark area immediately above the alveolus. X-ray examination may also yield useful information.

Most rhinologists, however, will adopt exploratory puncture from the nose as the most convenient and reliable diagnostic measure. It is evident that the results obtained by this method will depend upon the height in the antrum reached by the cyst, and whether the latter is intact or ruptured. If the sac is small and occupies only the lower part of the cavity,

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the trocar and cannula will pass above it; if then pus is brought away by syringing it must have been lying free in the antrum and assuming the absence of other sources, the sac must have been leaking recently. When the cyst is of medium size (Fig. 5), the trocar may pierce it or pass above it according to the inclination the instrument receives, so that different results may be obtained at successive explorations. If an intact cyst is entered, inflation and syringing will not be possible, and it will be necessary to introduce a second cannula to serve as a counter-opening, or to have recourse to suction, which sometimes proves useful in such conditions; the suction apparatus used in bronchoscopy can be quickly adapted for this purpose. On the other hand, when a cyst has ruptured, its contents, which may be copious, come away in the washings. The question of the presence of a cyst in the antrum should, therefore, be considered if trial puncture is impossible along an approximately horizontal plane but easy when the instrument is directed to a higher part of the cavity. Pronounced variations at intervals of a few days in the amount of pus washed out are also suggestive of a cyst which discharges intermittently. A closed cyst should be suspected when neither air nor solution can be injected, even with the cannula introduced to various depths, and after cocaine and adrenalin have been applied to the region of the ostium maxillare, but when suction reveals the presence of pus; if the fluid withdrawn contains cholesterolin the diagnosis of cyst is all but positive.

### Dento-nasal Cysts.

Dental cysts often grow upwards so as to produce bulging of the lateral wall or floor of the nose. In the case of the latter, the resulting elevation is situated beneath the anterior end of the inferior turbinate, is covered with thinned mucous membrane, has a bluish colour and fluctuates on pressure. In such terms Gerber described, in 1904, the rhinoscopic aspect which he regarded as due to, and characteristic of, dental cysts growing from the incisors. He also stated that some dental cysts manifested themselves only in this way and could not be diagnosed without rhinoscopy. The importance he attached to this appearance led to its being known as Gerber's sign (Fig. 6).

In this journal in June 1898, the writer described a



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group of 12 cases (3 personal, and the others previously recorded by M'Bride, Milligan, Zuckerkandl, etc.) of cysts of the floor of the nose. In the paper referred to the following passage occurs: "The appearances within the nose vary only in degree. When the cyst is small, it forms a greyish hemispherical eminence about the middle or outer half of the floor of the nose and just behind the junction of skin and mucous membrane. As the sac enlarges it extends backwards to the anterior end of the inferior turbinate, or a short distance below this, but rarely or never inwards to touch the septum. After the prominence in the nose has attained a certain size—on an average, that of a pea—the subsequent development appears to be downwards into the incisor fossa and forwards." In the course of the paper it is shown that these growths have no genetic connection with the teeth as is evident from their situation at an early stage, from the fact that in several cases the teeth have been intact, and further, that they probably originate as retention cysts from long ducts which are found in the mucous membrane in this situation.

There are thus two cystic conditions which may cause a prominence of the anterior part of the floor of the nose. In Fig. 7 the development of a dental cyst from an incisor is diagrammatically contrasted with that of a retention cyst of the floor of the nose. In the upper row the latter affection appears at first as an elevation of the mucous membrane only; when larger, it extends laterally beneath the anterior end of the inferior turbinate and somewhat forward so as to raise the ala; and at a still later stage, which is infrequently attained, it erodes the bone at the threshold of the nose and of the anterior facial wall, and grows downwards until it reaches or overlaps the root of the underlying incisor so as to give the impression that it originated from this tooth. In the lower row, the cyst at the apex of a diseased incisor is at first in the osseous substance; subsequently the bony wall of the incisor fossa may be bulged forward and eroded; and still later, having traversed the intervening bone, it may reach and elevate the floor of the nose.

These two affections, therefore, can be easily differentiated in their early stages of development but with difficulty later. There is little doubt that several of the cases of elevation of the floor of the nose reported by Gerber were examples of retention cysts, for he makes no mention of this variety of cysts

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when discussing the differential diagnosis (p. 511); he describes cases in which the cyst appeared only on the floor of the nose and not at all in the alveolar process (p. 513) and he has a strikingly large proportion of female patients, viz. 9, in a total of 10 cases. It has been shown that the subjects of retention cysts are women with few exceptions, whereas the frequency of dental cysts in the two sexes is about equal, *e.g.* of the writer's patients, 25 were males, and 20 females.

Gerber's sign, therefore, is of little use in the diagnosis of dental cysts excepting in a rare variety noted below, for long before they produce an elevation of the floor of the nose they manifest themselves elsewhere. On the other hand, the class of cases in which this sign was supposed to be of most value is made up mainly of retention cysts of the floor of the nose.

Some rhinologists have expressed the opinion that all cysts in the anterior part of the floor of the nose are of dental origin. This view has been completely disproved, however, by the cases of retention cysts of the floor of the nose shown at Societies or published by Banks Davis, Ball, Fullerton, Logan Turner, and Irwin Moore, and the dissections made by G. W. Dawson and the writer in order to demonstrate that these cysts have no connection with the teeth.

The microscopic examination of the two kinds of cysts supplies further evidence of their different origin. The epithelium lining the dental cyst is of the multilayered squamous celled variety, while in the retention cyst it is of a columnar or transitional type. The other histological features, viz., the inflammatory reaction and new formation of fibrous tissue going on to fibrosis in long-standing cases, are the same in both.

Mayrhofer's study of the pathological anatomy of the region under consideration should further modify the opinions held as to the significance of Gerber's sign. He has shown:—That dental cysts produce bulging of the lateral wall of the inferior meatus oftener than of the floor of the nose; that the former ("lateral swellings") push the inferior turbinate towards the middle line while the latter ("inferior swellings") press it outwards; that the cysts causing elevation of the floor of the nose instead of originating from the incisors as was supposed, spring almost invariably from other teeth; and that the exceptional variety of dental cysts in which Gerber's sign is of diagnostic importance, and to which reference was made

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above, is characterised by the proximity of the apex of the tooth of origin to the floor of the nose so that this becomes elevated while the cyst is still small. He makes no mention of retention cysts in this situation.

## **Malignant Growths in the Antrum.**

In making a differential diagnosis of dental cysts that have invaded the antrum it is important to keep in view the possible presence of malignant disease as the cause of distension. When this is due to a solid growth some feature in the case usually arouses suspicion, *e.g.* rapid development, prominence of the facial wall at a distance from the alveolus, marked bulging of the nasal wall, hæmorrhage, fœtor, or pain. On the other hand, a dental cyst may have invaded the antrum, given rise to the characteristic signs, and later malignant disease may develop. Thus, in one of the writer's patients, who gave a history of dental abscesses, the following conditions were found—crackling of the facial wall, foul pus on exploratory washing of the antrum, and cholesterin crystals on incising the bulging. When the sac was freely opened it was seen to be lined with innumerable pale polypoid growths and the underlying walls were necrosed. The growths proved to be of the nature of spindle-celled sarcoma.

## **Treatment.**

There is no difference of opinion as to the futility of attempting to cure a dental cyst by puncture or by antiseptic or caustic injections.

If the cyst is small, or surrounded by bone, it should be peeled out or thoroughly scraped out.

When of medium size and producing a bulging on the facial wall choice may be made of complete removal or Partsch's operation.

The former procedure can be carried out under local or general anæsthesia. It consists in making a sufficiently long horizontal incision in the gingivo-labial fold just above the lower edge of the erosion, if this exist, in the facial wall, or close above the alveolar border. The cyst itself, or thinned bone covering it, is thus brought into view. The soft tissues are then separated from below upwards in order to expose the facial wall of the superior maxilla, which may have acquired a leathery texture, or the eroded bony edge surrounding the

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exposed portion of the sac; the former is gouged out or incised, and sufficient to give good access is carefully separated from the cyst wall and removed. The sac can now be peeled out, after some of the contents have been allowed to escape. Separation is easily effected, except from the tooth of origin, if present, by working with an elevator, introduced between the cyst wall and its leathery investment or the eroded bony edge; commencement may be made below, and continued upwards on each side. After removal of the sac the bony cavity is lightly packed and the wound stitched, leaving only a small opening for withdrawal of the gauze and subsequent syringing until the cavity has epithelialised and filled up. The objection to this operation is the lengthy after-treatment.

In Partsch's operation a broad based flap of muco-periosteum is dissected upwards in order to expose the facial wall of the sac; a large segment of this is cut out with scissors, thus converting the cyst into a recess of the mouth; and the flap is tucked into the cavity and kept in position by gauze. Gerber improved this operation by dissecting the flap from above downwards and having the base below so that when introduced into the cyst it was much less liable to be displaced by movements of the cheek. The after-treatment, excepting for a few days following the operation when packing is used, consists in merely washing out the cavity. The deep part of the wall, which is untouched, gradually shrinks until the lumen is reduced to a small niche. The changes necessary to effect the obliteration take six to eight weeks in the case of a cyst as large as a walnut. In comparison with complete enucleation, this method is simpler, and the after-treatment shorter; the risk of the cyst closing again is insignificant unless too little of the wall has been resected.

The largest cysts are those which invade the antrum, and the problems connected with their treatment are of special interest to the rhinologist. Various procedures have been recommended—some of the more recent aim particularly at minimising the period of after-treatment.

Jacques, who has had an exceptionally large experience in this class of operations, introduced, in 1902, a method which meets the requirements in many cases. After complete removal of the sac he establishes free communication between the bony cavity remaining and the antrum by the total resection of the partition and then closes the buccal wound. Drainage

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by the ostium maxillare generally suffices unless the antrum itself is affected, in which case an opening is made into the inferior meatus as in the Caldwell-Luc operation.

If the cyst is separated from the antrum by a thick bony partition but is adjacent to the outer wall of the inferior meatus it is better to make a large opening through the latter and leave the partition untouched.

Of late, there is a growing tendency to condemn the enucleation of the sac and to aim at the preservation of its epithelial lining.

Thus, Mayrhofer has adopted Jacques' method as above described but without removing the sac or its epithelium. In some of his cases he has retained the anterior wall of the cyst so that on closure of the buccal wound the resulting cavity is completely lined by epithelium and the healing greatly expedited in consequence.

Birkholz, in a recent valuable contribution, advances a strong plea for the application of rhinological methods, and particularly of Denker's operation in the treatment of dental cysts which have invaded the antrum. The procedure consists in making a long horizontal incision in the gingivo-labial fold from above the wisdom tooth on the affected side to above the lateral incisor on the other side, opening the facial wall of the antrum and removing the crista pyramidalis, establishing very free communication between the antrum and the inferior meatus, and removing the anterior third of the inferior turbinate. The advantages claimed for this operation are—the excellent survey obtained of the contents of the antrum, the ease and rapidity with which it can be carried out, and the simple and short after-treatment from the nose.

Some of the methods referred to are still on trial, but from the results reported hitherto it would seem permissible to assume that the chief, if not sole, requirement for a successful issue is the making and maintenance of a large opening in the wall of the cyst, so that this communicates freely with the mouth, nose, or antrum; the pressure within the cyst being thus removed the sac shrivels and the displaced structures, *e.g.* the raised floor of the antrum, depressed palate, bulged facial wall, gradually resume their normal anatomical relations. It would also appear that the precautions taken in the past to enucleate the entire sac or thoroughly destroy its lining epithelium are unnecessary, and that Birkholz is correct in

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maintaining that the latter ought to be preserved; further, that a suppurating cyst when freely opened ceases to discharge pus; and that the buccal wound should be closed and the after-treatment carried out from the nose.

Most of the writer's cases were treated by complete enucleation; but in his more recent, Partsch's, Jacques', and Denker's methods were employed. For small cysts enucleation seems to be best; for somewhat larger, Partsch's method is to be preferred. If the cyst is in the outer part of the jaw and the antrum invaded, Jacques' procedure, or Mayrhofer's modification of it, is generally most suitable. Lastly, for those situated further forward in the jaw, or specially large, and invading the antrum so as to abut on its nasal wall, it might be sufficient to merely make a large opening into the sac from the inferior meatus.

REFERENCES.—Bautze, H., "Beitrag zur Lehre von den Kieferzysten," *Zeitschr. f. Lar.*, Bd. iv., S. 99, 1911. Birkholz, H., "Das Denkersche Verfahren . . . als die Methode der Wahl zur Operation von . . . Kieferzysten," *Arch. f. Ohren-, Nasen- und Kehlkopfheilkunde* 108, Bd. S. 224, 1921. Gerber, P., "Ueber die rhinoskop. Diagnose u. die Behandlung der Kiefercysten," *Arch. f. Lar.*, Bd. xvi., S. 502. Jacques, P., "Les kystes paradentaires et leur traitement," *Bull. et Mém. de la soc. franç. d'oto-rhinolaryngol.*, Tome xxxiii, 1re Partie, p. 61, 1920. Kelly, A. Brown, "Cysts of the Floor of the Nose," *Journ. of Lar., Rhin., and Otol.*, June 1898. Kunert, A., "Ueber die Differentialdiagnose zwischen Cysten und Antrumempyem," *Arch. f. Lar.*, Bd. vii., S. 34. Mayrhofer, "Ueber die genauere path. Anat. des Gerberschen Wulstes u. über die Operation grosser Kieferzysten," *Wiener klin. Wochenschr.*, No. 33, 1919. Oppikofer, E., "19 Zahnwurzelcysten und 1 follikuläre Cyste," *Arch. f. Lar.*, Bd. xxv., S. 45. Perthes, G., *Die Verletzungen und Krankheiten der Kiefer. Deutsche Chirurgie, Lief.*, 33a, 1907. Turner, J. G., "Discussion on the Pathology and Treatment of Dental Cysts," *Proc. Roy. Soc. Med.*, 1920, vol. xiii. (Section of Odontol.), p. 98.

## ANALYSIS OF SOUND BY RESONANCE.

*Description of a Model illustrating the presumed Resonance Mechanism of the Cochlea, with special reference to the Inertia of the Contained Fluids.*

By GEORGE WILKINSON, Sheffield.

THERE is probably as great a divergence of opinion on the subject of the mechanism of sound perception at the present day, as there has been at any time since Helmholtz announced the resonance theory. It seems, however, to be generally admitted that the theory of tone analysis by resonance if it were in itself tenable, would offer the completest solution of the problems of sound perception that has yet been advanced. There are, however, many difficulties in the way of its general acceptance. If the cochlea contains a series of resonators, they are different in many respects from any resonating instruments with which we are acquainted, and no one has, as yet, offered so complete an explanation of the mechanism of resonance within the cochlea as to enable us to visualise the working of the various parts.

**The Basilar Membrane.**—If we regard the transverse fibres of the basilar membrane as constituting the resonating elements, Helmholtz's comparison of them to a set of piano strings occurs to one at once as being the form of resonator to which they may be most aptly likened. Nevertheless, the basilar fibres differ in three important particulars from the piano strings—(1) in the minuteness of their scale; (2) in the fact that they are embedded in a mass of cells so as to form a continuous and extended membrane; (3) in that they are immersed in fluid.

(1) *Scale.*—Though the minute scale on which the cochlear resonator is constructed has an important bearing on the delicacy of its response to periodic impulses, and on the duration of its after-vibrations, it is a matter of no moment so far as affecting the capacity of the resonating elements to respond to vibrations of any required frequency. There is much misconception on this point, and the argument is repeated in one text-book after another, that the fibres of the basilar membrane cannot respond, at all events to the lower notes of the audible scale, as they are so short.<sup>1</sup> But the periodicity of each

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individual thread is determined by the formula for vibrating strings

$$n = \frac{1}{2l} \sqrt{\frac{t}{m}}$$

where  $n$  is the number of vibrations per second.  
 $l$  is the length of the string in centimetres.  
 $t$  its tension in dynes.  
and  $m$  the mass of unit length.

Theoretically, for any particular value of one factor such as  $l$ , any value whatever may be given to  $n$ , by assigning suitable values to the remaining factors  $t$  and  $m$ . The formula would still hold good were the scale 10, 100, or 1000 times smaller than that of the cochlea. Scale is limited only by the strength, fineness, and flexibility of the material available.

(2) *The fibres are embedded in a mass of cells, so as to form a continuous membrane.*—This, no doubt, impedes the movement of any particular fibre independently of the fibres on either side of it. As a consequence, we have to deal with movements of transverse strips of the basilar membrane, not individual fibres. As the tension is transverse only, the same formula, however, applies. We may take it that the layer of cells on either side of the basilar membrane is extremely flexible, and will offer no appreciable resistance to such small displacements of the basilar membrane as occur in vibrational movements. Their mass is merely one item in the term  $m$  of the formula, which we consider under the next heading.

(3) *The basilar membrane is immersed.*—It is this circumstance which creates the real difficulty, in so far as it entirely differentiates the cochlea from any form of resonator with which we are acquainted. It is a factor which has hitherto received scant attention, though in the writer's view, it is the key of the whole problem. It did not escape Helmholtz, though he offers no solution. He says: "The fluid in both galleries of the cochlea must also be considered as weighting the membrane, because it cannot move without a kind of wave motion in the fluid."<sup>2</sup>

### **The Formula for Vibrating Strings as applied to the Basilar Membrane.**

In former papers<sup>3</sup> the writer has put forward his views as to the part played by the fluid in the cochlear galleries,



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which constitutes the "load" on the transverse sectors of the basilar membrane. This "load" may be expressed in terms of a double column of fluid having the same sectional area as that of the vibrating sector, and equal in height to the sum of the distances of the sector from the oval and round

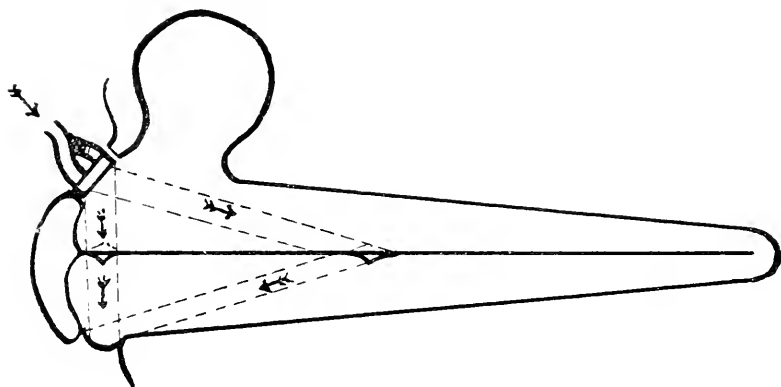


Diagram representing the cochlea unrolled. The two scalæ are shown divided by the basilar membrane. Two sectors of the membrane are represented as vibrating. The fluid enclosed between the dotted lines represents the "load" on each sector.

windows. In speaking of a double column of fluid, it is understood that it is not implied that the fluid moves in the form of a column, but merely that the mass of fluid moved is equivalent to the mass of the double column. It follows that the formula for vibrating strings

$$n = \frac{1}{2l} \sqrt{\frac{t}{m}}$$

$$\text{becomes } n = \frac{1}{2l} \sqrt{\frac{t}{db}}$$

when adapted to the special conditions present in the cochlea.

Where  $n$  = number of vibrations per second.

$l$  = the width of the basilar membrane at the level of the sector.

$t$  = the tension.

$b$  = the breadth of the vibrating sector.

$d$  = the sum of the distances of the sectors from the round and oval windows.

Consequently  $m$  varies directly as the distance of the sector from the basal end of the cochlear galleries. With regard to

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$l$ , we know that the basilar membrane varies progressively in breadth from about 0.16 mm. at the basal end to about 0.4 mm. at the apical end (Keith).<sup>10</sup> With regard to  $t$  we know that it increases progressively from apex to base, as shown by the increase in bulk and density of the attachment of the basilar fibres to the outer cochlear wall, *i.e.* the spiral ligament.<sup>4</sup>

The transverse sectors of the basilar membrane which lie nearest to the *basal* end are shorter, tighter, and less heavily weighted, and will consequently respond to impulses of high frequency. Those at the *apical* end are longer, slacker, and more heavily weighted, and will respond to impulses of low frequency. We have now an explanation of some points that have hitherto appeared obscure. We see why the shorter and tighter fibres are placed at the proximal or basilar end of the spiral and vice versa. By this arrangement the variations of the three factors in the formula, length, tension, and mass are all in the same sense. We also see why it is essential that the basilar membrane should be a continuous structure, and one reason, at least, why it should be covered by a layer or layers of cells. If the basilar membrane were not continuous and watertight, the fluid surrounding it would eddy in between the vibrating fibres from one side to the other, and there would be no calculable and invariable mass of fluid set in motion. If the mass moved by the movements of the sector were subject to variation, the periodicity of the vibrations would also vary. Any such variations would be incompatible with sound analysis by specific resonance of the sectors of the membrane. The cells covering the membrane, hitherto regarded by many as a hindrance to the vibratory movement of the basilar membrane, are seen to be an essential feature in regulating the vibrations according to the formula, in so far as they render the membrane water-tight, without interfering with its flexibility. We also see why it is that there are two openings into the cochlea from the middle ear. These are the only parts where the organ is not rigidly enclosed. They are both at the basal end of the spiral, at approximately equal distance on either side of the commencement of the basilar membrane. By this arrangement the length of the columns of fluid progressively increases from base to apex, and being of approximately equal length on either side they balance one another.

The explanation offered above of the bearing of the hitherto neglected factor of the inertia of the cochlear fluid on the

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resonance mechanism, is in the form of a deduction from the more elementary facts of the anatomical structure of the organ. One realises that to make the reasoning convincing one ought to offer some experimental proof, or at least experimental illustration. Direct observation of the cochlear movements is of course out of the question, nor can we attempt any adequate experiment on the minute scale of the cochlea. It has, however, been pointed out, that scale is of no account in the application of the formula for vibrating strings. The model resonator here described appears to the writer to fairly represent the essential conditions under which the basilar membrane works, though on a greatly enlarged scale. To some extent it bears out the applicability of the formula to membranes of varying transverse tension immersed and oriented as is the basilar membrane, and, within limits, it illustrates its presumed resonating action.

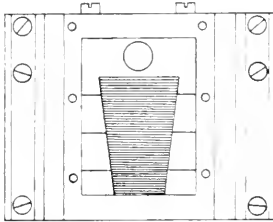
## Description of the Model.

The resonator model consists of a brass box  $5 \times 5\frac{1}{2} \times 6\frac{1}{2}$  cm. It is divided into an upper and lower chamber, which are separated by a flat brass plate (representing the scalæ of the cochlea and the lamina spiralis). The brass plate has an opening down the middle, wider at the distal than the proximal end, the "basilar fissure," filled up by the "basilar membrane," and also a semicircular opening beyond the "basilar fissure," the "helicotrema." The top of the upper chamber is provided with a glass window, through which the movements of the basilar membrane may be observed. The upper chamber is shallower than the lower (1.75 as against 2.1 cm.). This brings the window nearer to the basilar membrane than would be the case if the chambers were of equal height, so that the movements of the different parts of the membrane may be better observed. The anterior wall of each chamber is provided with an opening, the "foramen rotundum"  $2 \times 0.4$  cm., and the "foramen ovale,"  $2 \times 0.9$  cm. respectively. These openings are closed by rubber membranes, which are secured in place by sunk washers. A small wooden plunger, the "stapes," is attached to the lower (*i.e.* the larger) membrane. At the back of each chamber are small holes closed by screws, "filling holes," through which fluid can be introduced by means of a syringe with a fine nozzle, to fill the chambers.

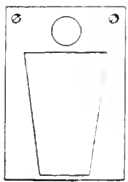
The technical problems to be solved are:—(1) The material suitable for the "basilar fibres"; (2) the method of applying the fibres to the plate; (3) the application of the proper tension to the fibres; (4) the fixation of the fibres so that neither the position of the threads nor their tension will alter; (5) the nature of the embedding material

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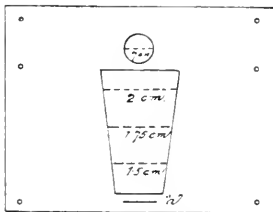
to be used to convert the series of threads into a continuous even membrane; (6) the fixation of the threads with precision at the margins of the "basilar fissure" so as to definitely limit the length of the vibrating segment; (7) the method of demonstrating the move-



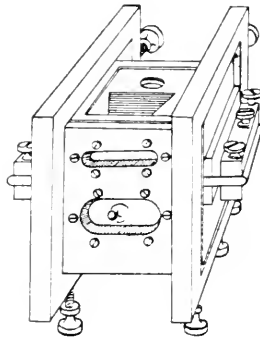
UPPER CHAMBER viewed from above, showing window in centre and screws closing filling holes at back. Interior of chamber seen through window.



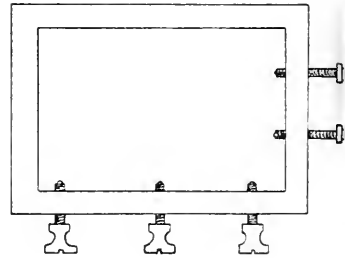
THE COVERING PLATE.



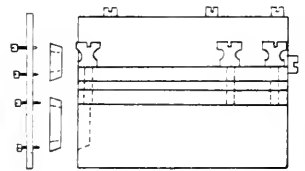
THE PLATE DIVIDING THE UPPER AND LOWER CHAMBERS, showing dimensions of the "basilar fissure" and "helicotrema." The line "a" shows the level of the rubber membranes closing the round and oval windows.



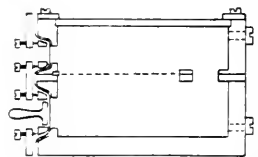
PERSPECTIVE DRAWING OF RESONATOR from the front, showing "round" and "oval" windows and "stapes."



CLAMP.



SIDE VIEW OF RESONATOR.—In front are the sunk washers and the plate and screws fixing them. The screws at the back close the "filling holes." Those at the top hold the plate retaining the glass window in position.



SECTIONAL DIAGRAM OF RESONATOR, showing relative positions of membranes closing windows, "basilar membrane," and the "helicotrema."

FIG. 1.—COCHLEA DEMONSTRATION MODEL.

ments of the "basilar membrane"; (8) the means of making the model watertight when complete.

(1) *Material used for the "basilar fibres."*—It is obvious that a soft animal or vegetable material would conform more closely to the natural "basilar fibres" than any kind of wire, and would give a more delicate response to impulse. Fine elastic threads were first tried, at  $\frac{1}{2}$  mm.

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intervals, each thread being stretched by an appropriate weight. They failed owing to their imbibing water when immersed, which entirely altered their tension. Well-soaked horse hair was given an extended trial. It was found that horse hair when stretched in water underwent an elongation during the first twenty-four hours, but subsequently retained a fairly constant length. This necessitated the horse hair threads being kept constantly soaked during their application, which was found to be inconvenient. The variation in width of the individual hairs was a disadvantage. Further, it was found impossible to fix the series of threads so as to maintain their exact tension and spacing. Finally one was driven to use wire. The disadvantages of wire are many, but it has the great recommendation of being capable

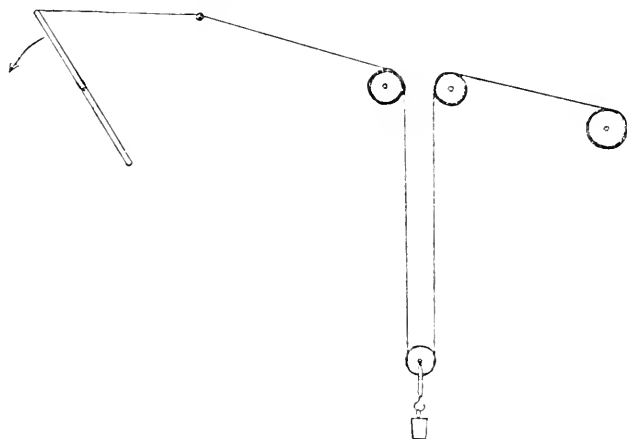


FIG. 2.—Showing the method of winding the wire off the reel through a system of pulleys over travelling guide on to the plate fixed in a lathe.

of being accurately and permanently fixed in position by soldering. Suitable wire must be very fine and pliable, but strong. Fine wire, unless very carefully drawn, has a tendency to curl which makes it impossible to work with. Several kinds of wire have been tried. A soft brass wire  $1/14$  mm. in diameter gave fair results. At present phosphor-bronze ribbon (as used for suspending galvanometer needles) is being used. The ribbon is 0.23 mm. wide and only 0.012 mm. thick. Its fineness more than compensates for its stiffness and it can be wound very evenly. It is, however, very costly and rather delicate to handle; 25 metres of strip are required for one winding of the plate and a single broken thread ruins the whole.

(2) *Method of application.*—Absolute evenness of spacing of the wires, with close juxtaposition of the threads is aimed at. The plate is placed in a lathe, and the wire lead off the bobbin through a series of pulleys arranged as in the figure (Fig. 2). The lower pulley is

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weighted, so that the wire has an even tension during the operation of winding. The ribbon is led to the plate over a small pulley, the axis of which is attached to an arm held by the travelling tool holder of the lathe. One end of the strip is soldered in position on the plate. On the lathe used the smallest pitch of the traveller is  $1/84$  inch for each turn, almost exactly 0.3 mm. This gives three and  $1/3$  turns to each millimetre of the plate. The space between each thread will then be 0.07 mm.

(3) and (4) *The production of the tension and fixation of the fibres.*—The opening in the plate (Fig. 3) representing the “basilar fissure” has

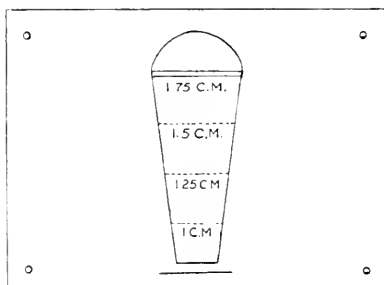


FIG. 3.—Showing dimensions of plate, “basilar fissure,” and “helicotrema.”

the following dimensions:—length 3.7 cm. At 1 cm. from the level of the membrane filling the round and oval windows, the width is 1 cm.

at 2 cm. it is 1.25 cm. wide.

at 3 cm. it is 1.5 cm. wide.

at 4 cm. it is 1.75 cm. wide.

For reasons to be explained presently, it was found necessary to graduate the tensions arithmetically. This restricts one's choice of predetermined positions for the notes on the scale to two. The positions of the other notes may then be determined by calculation. The plate from which the photographs here reproduced were taken (p. 460), was graduated to give 400 D.V. per second at 1 cm. from the membrane closing the round and oval windows, and 32 D.V. per second at 4 cm. (the distal end of the scale).

Thus at 1 cm. from the proximal end

$$n = 400.$$

$$l = 1 \text{ cm.}$$

$$d = 2 \text{ cm.}$$

for “*b*” (breadth of the sector along the axis of the basilar membrane) we can select any value we like, so long as it is small, for “*l*” and “*b*”

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vary proportionately, *i.e.* if we make “*b*” larger, we embrace more threads, and so increase “*t*,” which is the sum of the tensions on the individual threads included in the sector.

Call “*b*” then 0.1 mm.

$$n = \frac{1}{2l} \sqrt{\frac{t}{bd}} \quad i.e. \quad n^2 = \frac{1}{4l^2} \frac{t}{bd}$$

$$t = n^2 4l^2 bd = 400^2 \times 4 \times 1 \times 2 \times 0.1 = 128,000 \text{ dynes or } 130.5 \text{ grams. weight.}$$

(A small correction has to be applied for the obliquity of the direct distances between the windows and the selected point. This amounts to  $\frac{2.2}{2}$ .

$$130.5 \times \frac{11}{10} = 143.5 \text{ grams.})$$

at 4 cm.

$$\begin{aligned} t &= 32^2 \times 4 \times 1.75 \times 1.75 \times 8 \times 0.1 \\ &= 10035.2 \text{ dynes, or } 10.2 \text{ grams. weight.} \end{aligned}$$

(the correction for obliquity is very small and may be neglected).

We now require to make a series of weights graduated arithmetically about these fixed points. For the purpose one procures a sheet of lead. From this, a rectangular oblong 10 cm.  $\times$  6 cm. is accurately cut off with knife and rule. It is found to weigh exactly 110 grams.

One sq. cm. of the lead therefore weighs  $\frac{11}{6}$  grams. The weight required to give a tension of 143.5 grams. to a millimetre wide strip of the membrane at a point 1 cm. distant from the windows (400 D.V.) will have an area of  $143.5 \times \frac{6}{11} = 78.3$  sq. cm., that at 4 cm. (32 D.V.)

$$10.2 \times \frac{6}{11} = 5.6 \text{ sq. cm.}$$

In winding the plate, the wire is taken 1 mm. beyond the “basilar fissure” at either end. The whole winding therefore covers 3.9 cm. The 400 D.V. position falls 9 mm. from the proximal end of the winding, and the 32 D.V. at 1 mm. from the distal end.

A base line is cut in the lead sheet 156 cm. long, and marked off in distances of 4 cm. each. There will be thirty-nine such divisions. From these abscissæ, ordinates are erected. The 9th ordinate will be  $\frac{78.3}{4} = 19.6$  cm. long, and the 39th ordinate  $\frac{5.6}{4} = 1.4$  cm. long.

The top of these ordinates are joined by a straight cut, which is continued to the two ends of the area marked out by the ordinates. If the sheet is now cut up along the base line, the ordinates and the

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upper limiting line, we shall have a series of 39 weights graduated arithmetically, each differing by

$$\frac{143.5 - 10.2}{30} = 4.44 \text{ grams.}$$

the weight of each being equal to the tension in grams. required on the corresponding 1 mm. wide strip of the "basilar membrane."

The wires are now soldered along the upper edge of the plate, and clamped down. A thin strip of silver is soldered along the length of the wires at the back of the plate, parallel to and about 1 cm. from the clamp. The wires are cut across between the clamp and the silver strip. Holes are drilled in the silver foil at intervals of 1 mm. The plate is fixed upright in a vice, and the threads allowed to hang down.

Several attempts were made to graduate the tensions so as to obtain equal spacing of the octaves. This necessitated dividing the silver strip into sections 1, 2, or 4 mm. wide, and hanging the

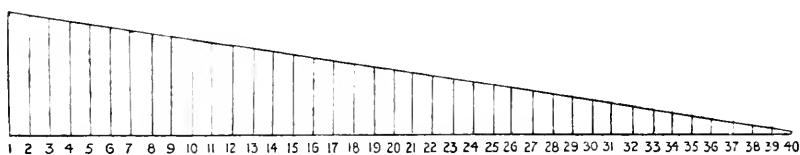


FIG. 4.—Lead sheet marked out for series of weights. Scale:  $\frac{1}{10}$  one sq. cm. of lead weighs  $\frac{1}{10}$  grammes.

weights from the strips of fibres so divided up. However, it was found almost impossible to carry out the delicate operation of dividing the silver strip without detaching one or more wires, which ruined the whole winding. Further, it is very difficult to get the wires back into perfect alignment after dividing the strips. Consequently, it has been found better to leave the strip undivided, and to hang the weights along it at regular intervals of 2 mm.

In this way only an arithmetical graduation of tensions is possible, but this is of no practical importance, as it has proved impossible up to the present to tune the strings with any high degree of accuracy. The theoretical positions of the different notes can be calculated.\*

The weights are suspended from the strip at varying levels so that they may hang clear of one another, and each exerts its appropriate tension (see Fig. 5).

\* The position of a note of frequency  $n$  is given by the formula

$$n = \frac{1}{2(.75 + .25x)} \sqrt{\frac{\{143.5 - 44(x-1)\}^2 \cdot 981}{2x \times .1}}$$

where  $x$  = the mean distance of the segment giving the note from the membranes closing the windows.



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(5) *Embedding the threads.*—The threads are embedded by pasting on to either side of them a piece of thin cigarette paper soaked in formalised gelatin. The lower paper is cut to the exact shape of the opening. The upper overlaps the opening in every direction. The gelatin used is a 5 per cent. solution, to which is added  $\frac{1}{3}$  of its bulk of 10 per cent. formalin solution after melting and before applying. Care

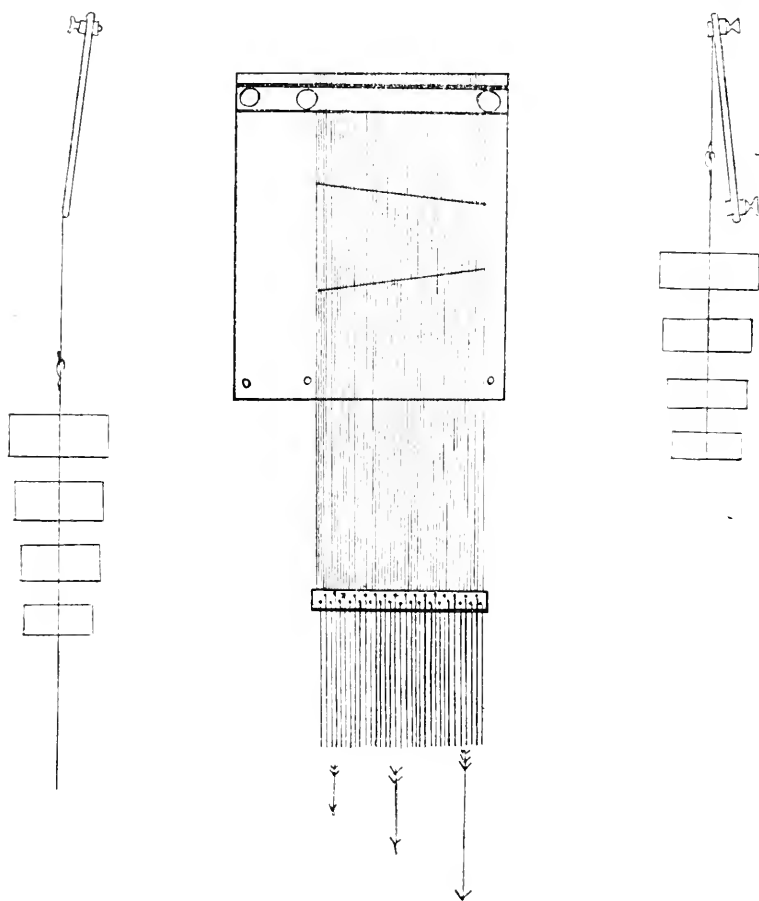


FIG. 5.

is required to prevent air bubbles being left between the two films. When dry, the upper surface of the film is painted over with undiluted formalin to harden the surface, the liquid being immediately dried off with filter paper. The formalin gelatin, when soaked, makes a very flexible film which is fairly durable. Moulds grow upon it, and to guard against this a 0.5 per cent. formalin solution is used in place of pure water for filling the resonator.

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(6) *Fixation of the ends of the vibrating segments.*—This is effected by means of an upper plate having an aperture to correspond with that of the lower plate, on to which it is screwed at the distal end. The outside edges of the upper plate fit into a groove in the lower surface of the upper box which presses it down in position when the parts of the model are clamped together. A straight edged folded slip of cigarette paper, soaked in formalised gelatin, is laid accurately along the outer edge of the opening in the plate, on either side under the covering plate, to make pressure on the threads and to limit the length of the vibrating segments.

(7) *The "indicator."*—It is extremely difficult to detect the vibration of the threads with the eye, or even with a lens. We are thus driven to use an indicator powder on the surface of the membrane to show up the points of maximum vibration. This is a coarse method. No doubt the finer vibrations of the threads are unrecorded. It is, unfortunately, just these finer vibrations that we wish, but are unable to follow. Various powders have been tried. Heavy powders weight the membrane too much. Those that are too light or too fine diffuse themselves in the liquid and obscure the view. Very fine powders appear to be more affected by the currents in the liquid than by the vibrations of the membrane, and are unsuitable (*cp.* Rayleigh, *Sound*, vol. i., p. 368). A coloured powder shows up better than a white one. Blue enamel powdered so as to pass a sieve 60 to the inch, but to be stopped by one 80 to the inch, is used. This shows up well, and the grains are about the right size, and the specific gravity is neither too high nor too low.

8. *Method of sealing up the box to render it watertight.*—Under this heading we have to consider (a) the fixing of the glass window, (b) the fixing together of the upper and lower chambers and string plate, and (c) securing the membranes closing the round and oval windows.

(a) *The window* is set round the edges with a mixture of litharge and glycerine, and held by a small fixing plate screwed into the top of the upper chamber.

(b) *Fixing the chambers and plate together.*—In order to make a watertight joining, the surfaces which bear on the plate must be fairly wide. This is why the walls of the chambers are made so thick (0.5 cm.), and also why they are provided with flanges at the sides to increase the bearing surface where the wires come through, where leakage is most liable to take place. Various forms of wax have been tried for cementing material. A form of modelling wax, known as "play wax" at the toy shops, answers very well. It is just about the right consistence and clean to work with. The wax is spread thinly and evenly on all the bearing surfaces. The upper and lower chambers are fixed in position on the plate, and the front plate is held in position

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till the clamps are applied round the whole, and fixed by gradual tightening of the screws. The excess of wax is pressed out of the cracks as the screws are tightened, and a watertight junction is made all round.

(c) *The membrane closing the round and oval windows.*—This gave a good deal of trouble in the earlier experiments. In the present model the membranes are secured by sunk brass washers fitting into deep grooves round the windows. In order to fix the washers there is a plate with holes in it to correspond with the oval and round windows, surrounded by screws. This plate is clamped on to the model when it is finally put together, and by tightening the series of screws the washers are pressed home. The wooden plunger or stapes is glued on to the lower membrane. This membrane is fixed with its lower edge close to the edge of the oval window, so that it moves as though hinged at its lower margin, and the greatest movement is at the upper edge.

The whole interior of the model is now filled through the filling holes with fluid by means of a fine syringe. Boiled water is used, to which formalin is added to 0.5 per cent. One reason for boiling the water is to expel dissolved air, otherwise small bubbles will form within the cavity which are very difficult to detach and get rid of. Larger bubbles can be avoided by careful filling.

As the model is filled with the windows downwards, the membranes closing them are bulged outwards somewhat, by the pressure of the fluid. When tested immediately after filling, the various notes in the scale are found to be raised one or two millimetres higher than they are later, when evaporation of some of the fluid through the rubber membranes has caused the latter to return to their proper place or even to be drawn inwards. The reason for the variation is, of course, that the length of the columns of fluid is increased when the membranes are bulged, and decreased when they are in-drawn. After standing twelve to twenty-four hours a bubble will usually be found within the model. Air is sucked in when the pressure is reduced by evaporation beyond a certain point, probably around the membranes. This only necessitates removing a screw from one of the filling holes and introducing a few more drops of fluid.

## Working of the Model.

The transverse sectors of the "basilar membrane" in the model are thrown into more or less well defined and localised sympathetic vibration by touching the "stapes" lightly with a vibrating tuning fork. A fork of 32 D.V. provokes response only at the extreme end of the membrane (4 cm. from the level of the oval and round windows).

The 64 D.V. fork gives a fairly well localised response limited

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to the middle of the segment of the membrane lying between the 3 and 4 cm. lines. As will be seen by comparison of Figs. 6 and 7 the indicator powder is cleared off this area, whilst that on the part of the membrane higher up is but little disturbed. The surface of the membrane is not so even as one could wish in this region, particularly at "d," where there is a "hillock" which interferes with the sliding of the grains of the indicator.

The response to the 200 D.V. fork (Figs. 8 and 9) is not so satisfactory. The calculated position for 200 D.V. is almost exactly at the 2 cm. line, the middle line of the scale. The point of maximum response is actually considerably lower, at about 2.5 cm. and the whole reaction is more diffuse than it should be. The graduation of the tension in this part of the membrane is evidently imperfect. There is also a partial vibration approximately at the 100 D.V. position (3 cm. line).

The 400 D.V. reaction appears very close to the calculated position at the 1 cm. line, just a shade below (Figs. 10 and 11). It is quite well localised, but there is a well-marked partial vibration at the 200 D.V. position, and another less marked at the 100 D.V. position.

The results shown in the photographs (Figs. 6-11) are coarse results obtained by distributing the indicator powder thickly over the membrane and applying the forks sufficiently forcibly to produce a considerable displacement of the powder. Much more delicate and better localised responses are obtained by powdering the membrane sparsely and applying the forks with only just sufficient force to elicit a visible response, but the result can only be followed by observing the movements with the eye, and could not be demonstrated in a photograph. Nevertheless, the writer contends that even these coarse reactions show clearly that the "basilar membrane" possesses progressive differentiation in the periodicity of its vibrations.

A response to 512 D.V. is obtained in the region above the 1 cm. line. The resonance, therefore, extends over 4 octaves.

*Sources of error.*—The model in its present form, imperfect though it is, is the outcome of many trials and failures with different models and materials from which the writer has learned a good deal as to the sources of inaccuracy. The essentials for definite localisation are *sensitiveness* and *accuracy of graduation of tensions*.

*Sensitiveness.*—To obtain this essential, the materials used for the basilar threads must be extremely fine. If coarse, their "initial stiffness" is too great, and much force must be applied to make them

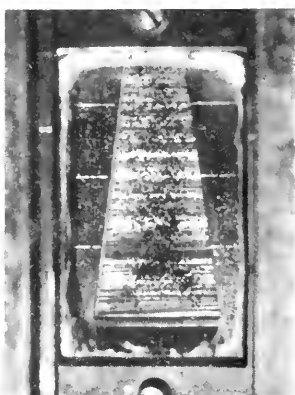


FIG. 6.—Before.

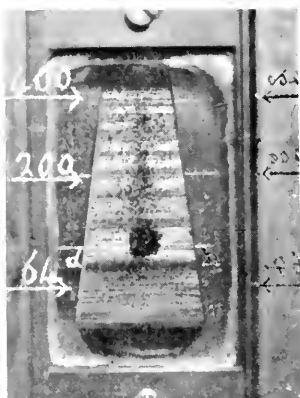


FIG. 7.—After.

Applying a tuning-fork giving 64 D.V. per sec. to the "stapes." The point of maximum vibration agrees fairly closely with the calculated position, as shown by the arrow.



FIG. 8.—Before.

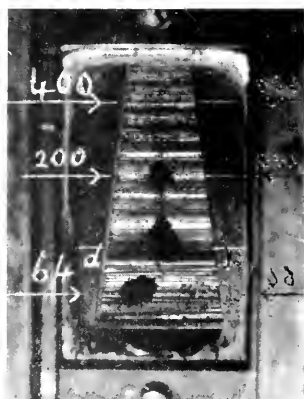


FIG. 9.—After.

Applying a tuning-fork giving 200 D.V. per sec. to the "stapes." The point of maximum vibration comes out about 0.4 cm. below the calculated position, as shown by the arrow.

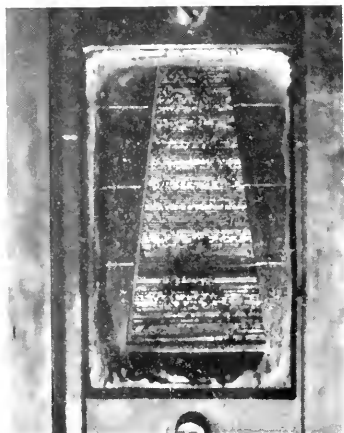


FIG. 10.—Before.

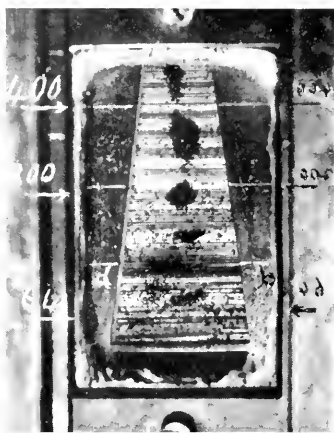


FIG. 11.—After.

Applying a tuning-fork giving 400 D.V. per sec. to "stapes." The point of maximum vibration agrees closely with the calculated position, as shown by arrow. Lower down the scale there are indications of partial vibrations of "basilar fibres" at various points.

SHOWING DISTRIBUTION OF THE INDICATOR POWDER.



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move at all. It is an essential condition for eliciting the true note of any form of resonator, that the stimulus applied should be only just sufficient to evoke response. With excessive stimulus all resonators show forced vibration for notes on either side of the fundamental. Further, the formula for vibrating strings is only applicable to vibrations of a very small amplitude as compared to the length of the string. For vibrations of greater amplitude, the periodicity is altered, and

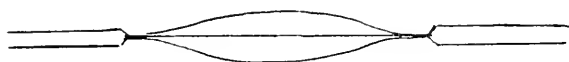


FIG. 12.

resonant response is less accurate. To maintain the sensitiveness of the membrane it is also essential that the embedding film should be thin and flexible.

The formula for vibrating strings is subject to modification by two factors, which we may term the *stiffness* and the *resiliency* of the strings. Wire that possesses stiffness when clamped at two points vibrates in the form shown in Fig. 12, what one may call a double ogival curve, whereas the true theoretical form of vibrating string is what one may call a lenticular curve (Fig. 13).

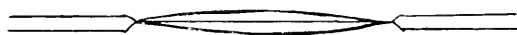


FIG. 13.

It is obvious that in the first form the effective length of the string is shortened, and the tone will be raised. The factor is a large one where the string is short.

If a wire be clamped at one end and bent out of the straight, the force tending to bring it back to its original direction is *resiliency*. In the formula for vibrating strings resiliency reinforces tension.

The formula may be written more accurately

$$n = \frac{1}{2(l - k_1)} \sqrt{\frac{t + k_2}{m}}$$

where  $k_1$  is a constant depending on the stiffness, and  $k_2$  a constant depending on the resiliency of the string.

The bearing of these factors is well seen in a former model strung with brass wire 0.07 mm. gauge. The responses obtained were all about  $\frac{1}{2}$  to  $\frac{2}{3}$  octave too low, *i.e.* the pitch of the strings themselves was too high by a corresponding amount.

*Accuracy of graduation of tension.*—The greatest difficulties in the construction of the model fall under this heading. In the first place, absolute evenness of spacing of the threads is necessary, as the total

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tension in each segment of the membrane is the sum of the tensions of the individual threads included in that segment. If one mm. segment contains 2 and the next 4 threads, the tension of the one will be approximately only half that of the other. Even spacing is very difficult to attain in the lower part of the scale where the tensions are low, and insufficient to take all the "set" out of the wires.

In the process of soldering, some heating of the wires takes place, and after fixing they cool and contract, thus raising the tensions.

After putting the waxed parts of the model together, and during the tightening of the clamps an alteration of tension of some of the wires always occurs from the drag of the wax on them. This is shown by the fact that whenever it is necessary to take the model to pieces, rewax and refix it together, the tuning of the wires is always altered in some part of the scale.

*Partial vibrations and overtones.*—It is rather surprising to find partial vibrations so readily set up in the strings that are so short. All the notes in the upper part of the scale show well-marked partials at the level of the octave below, and those at the top of the scale show a whole series of partials, unless the exciting fork is applied with only just sufficient force to evoke the minimal perceptible movement of the primary tone. Similarly, the overtones present in the lower forks produce corresponding reactions on the membrane, unless the forks are struck very gently, and applied lightly.

*The "helicotrema."*—In the earlier experiments the hole at the bottom end of the plate, representing the helicotrema, was made very small (2 mm.). The result was unsatisfactory, as it was difficult to elicit any localised response, merely a diffuse tumultuous movement resulting on stimulating the membrane. At Professor Leathes' suggestion, I enlarged the helicotrema to 7 mm. and immediately began to obtain indication of localisation. In the present model the helicotrema is represented by a semicircular opening of the same diameter as the end of the basilar membrane (1.75 cm.). There is a small vibrating pointer in the helicotrema, which can be seen to be thrown into vibration when the lower forks (32 D.V. and 64 D.V.) are applied to the stapes. Vibrations are not perceptible with the higher forks though they are probably present. It is evident that the helicotrema is an essential structure in the organ of sound perception, acting as an escape for the "un-exhausted energy" of the sound wave, and thus allowing the differential effect due to resonant action to develop without being obscured by diffuse forced vibrations.



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*"Bone conduction."*—Well-localised responses are elicited by applying the butt of the large tuning-forks to the front end of the model without touching the stapes, but to elicit this effect the vibrational energy of the fork must be ample. It cannot be elicited by the smaller forks.

In view of all these sources of inaccuracy, one cannot claim that the model is in any way an instrument of precision. Possibly it can be still further improved to eliminate some of the defects. It can only aspire to copy in some sort of remote, inaccurate, and coarse fashion, the marvellously delicate resonating mechanism of the cochlea.

## **Deduction from the Model, as to Sound Analysis in the Cochlea.**

The question now arises, what light does the model resonator throw upon the mechanism of sound analysis in the cochlea?

It may be fairly claimed for the model that it demonstrates that the transverse sectors of the "basilar membrane" are "loaded" by the fluid in the chambers, and that the load varies directly as the distance of each particular sector from the round and oval windows. The same relationship between "load" and relative position will hold for the sectors of the basilar membrane in the cochlea.

Now we know that the basilar fibres vary in length, and that the increase in length is progressive from the basal to the apical end of the basilar membrane.

Further, we have good grounds for assuming that there is a progressive increase in tension on the basilar fibres from apex to base. This assumption is based on the fact first pointed out by Albert Gray,<sup>4</sup> in 1900, that the spiral ligament which attaches the basilar fibres to the outer wall of the cochlea increases progressively in bulk and density from the apex to the base of the cochlea. It is difficult to imagine any explanation of this striking fact other than that the spiral ligament is actually the organ for regulating the tension of the basilar membrane, the tension it exerts on each basilar fibre being proportionate to the bulk and density of the ligament at the point where it is attached.

We therefore have a threefold differentiation of the basilar fibres, for length, tension, and mass. In all three cases the variation is in the same sense. The fibres that are shortest

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are also tightest and lightest, those that are longest are loosest and most heavily loaded. Now every tense string has a definite periodicity of vibration, depending on its tension, mass, and length.\* If these factors vary progressively, the periodicity of the strings will extend over a longer or shorter scale. If a periodic impulse whose frequency falls within the limits of the scale acts on them, the string of the same periodicity will



FIG. 14.—Section through the axis of the cochlea, magnified 15 diameters. The progressive increase in bulk and density of the spiral ligament from the apical to the basal turns of the cochlea are clearly shown.

vibrate sympathetically. We cannot prove that the degree of differentiation of the basilar fibres is sufficient to give the 10 to  $10\frac{1}{2}$  octaves of the audible scale, but we can calculate approximately the upper and lower limit of tension necessary to give the required differentiation.

\* It has been wrongly assumed that the basilar fibres must be "elastic" if they are to vibrate, but the formula for vibrating strings takes no account of elasticity. Many writers on the subject use "elasticity" in the sense of "extensibility." A fibre which extends in length under the increase of tension to which it is subject during the vibrations conforms to the formula less closely than one which does not stretch.

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**Limits of Tension of the Basilar Membrane.**—The calculations for the upper and lower limits of tension of the transverse sectors of the basilar membrane have been given in the writer's former article.<sup>5</sup> The maximum tensions for the extreme basal fibres were found to be somewhere about 18.6 grams. weight (approximately  $\frac{2}{3}$  ounces) for a strip 1 mm. wide and the minimum for the extreme apical fibres, 4.6 mgrms. (approximately  $\frac{1}{14}$  gram. weight). The result of experiments on the breaking strain of various animal fibres is also given. By reducing the sectional area of the fibres tested to that of a strip of basilar membrane, the following results were obtained—

For silk-worm gut . . . . .	159 grams.
Human hair . . . . .	$\left\{ \begin{array}{l} 60 \\ 84 \\ 52 \end{array} \right.$ "
Mouse-tail tendon . . . . .	69 "

from which the conclusion was deduced that the basilar membrane could readily withstand the maximum tension calculated according to the formula, supposing the material of which it is composed to have a tensile strength at all comparable to that of silk-worm gut, human hair, or mouse-tail tendon.

The range of tensions as calculated above, is not merely a possible one with regard to the strength of materials, but has a certain *a priori* probability. The lower limit is low, but not infinitesimal, and the upper limit is fairly high, but well within the limits of safety for any ordinary accidental increase of strain, such for instance, as from explosive noises.

**Theories of Hearing.**—No theory of hearing can be taken seriously which fails to give a reasonable explanation of, at all events, the more elementary and obvious features of the structure of the cochlea; for, after all, our conceptions of the working of the cochlea have to be deduced from what we know of its structure. The structural factors with which we have been dealing, viz., the varying length of the basilar fibres, the varying distances at which they are placed from the windows, and the varying bulk of the attachments to the outer wall of the cochlea, may all be classed among the more salient features of the structure of the organ. They are not histological features; they are all appreciable by the naked eye. The inference to be drawn, viz., that there is a threefold differentiation of the basilar fibres for length, tension, and mass, and that this

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differentiation is progressive, and in the same sense, each factor appears to the writer to be entirely logical, and indeed inevitable. So well marked a differentiation of structure must connote a corresponding differentiation of function. If this be not for the purpose of sympathetic resonance, the writer fails to see any alternative explanation.

Only one assumption has to be admitted in order to deduce that the basilar fibres are differentiated for periodicities covering the whole audible scale, viz., that these tensions vary between limits of approximately 20 grams. and 4 mgrms. per millimetre strip.

If, however, this be not admitted, it must be granted that the degree of differentiation which the basilar membrane undoubtedly exhibits, must entirely do away with the possibility of its acting, as a whole, in recording pressure variations transmitted by the stapes. This puts out of count the theories, for example, of Rutherford, Lipps, and Wrightson. Nor is the basilar membrane adapted for the formation of "pressure patterns" as conceived by Ewald and Waller. Ewald's artificial cochlea misrepresents the basilar membrane in every particular.<sup>6</sup> It is not differentiated as to width, or tension and its "windows" are placed in an entirely different relation to the basilar membrane than obtains in the cochlea. The "travelling bulge" theories of Meyer and ter Kuile may serve as an elaborate analysis of a single harmonic impulse within the cochlea, but they leave out of account the inertia of the cochlear fluids, and when applied to a series of such impulses they mean sympathetic resonance pure and simple. As Lehmann well puts it, "only that part of the basilar membrane which has the period of oscillation of the oval window will regularly make room for the fluid displaced by the latter. Parts nearer will be bulged out first, but they will clash with the period of the stirrup at once, and so the fluid displaced will be pushed onwards till it gets to the part in tune with the motions of the stirrup. Then the oval window, that part of the basilar membrane, the round window and the columns of fluid between these windows and the basilar membrane will pendulate synchronously and any vibrations of other parts will be damped out."<sup>7</sup>

Luciani<sup>8</sup> adopts the view that the tectorial membrane is the organ for sympathetic vibrations. This view has been advocated by Shambaugh, Hardesty,<sup>9</sup> and others. It offers no

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explanation of the threefold differentiation of the basilar membrane, and is entirely confuted by the histological work of Keith,<sup>10</sup> ter Kuile,<sup>11</sup> Wittmaack,<sup>12</sup> and others, from which it is clear that the tectorial membrane in the undamaged cochlea is attached to the apex of Corti's organ. Its movements must follow those of the basilar membrane, which its extremely loose texture and delicate stalk of attachment to the denticulate lamina enable it to do without hampering the latter.

If the threefold differentiation of the basilar membrane be admitted, it can no longer be maintained that "there are no structures in the cochlea capable of performing the function of resonators." If the basilar membrane has any functional significance at all, it must be for purposes of resonance. The real difficulty is one inherent in every system of resonators, viz., that no form of resonator is absolutely true in the sense of reacting exclusively to a note of one periodicity. There is always a response, though of less intensity, to tones lying on either side of the principal tone.

Consequently, in the cochlea, resonating elements on either side of the "maximum" must be set in motion at the same time. How is it that we hear a single note of decided pitch? It is plain that at this point we reach the limit of what can be accomplished by the *mechanical* part of the analytical apparatus. The result is handed on to transmitting apparatus through the auditory nerve terminals, and this has to apply the corrective factor. The position of the "maximum point" within the resonating scale determines our perceptions of pitch, whilst the total number of sense elements excited is interpreted as something else, either loudness or volume of sound. For the nature of this corrective action which determines pitch according to the position of the "maximum" on the resonating series we are not entirely without guidance. Albert Gray shows that a similar process of central analysis is applied in the location of pressure sensations by the sense of touch.<sup>4</sup> We have to suppose a "blocking" of the smaller by the greater stimuli, in one or other of the lower centres through which the cochlear nerve fibres pass before reaching the cortex. Such an assumption is an entirely different matter to that which is made by those who hold that the brain analyses sounds according to the frequencies of the stimuli communicated to the nerve terminals in the cochlea. This involves the instantaneous recognition by the presumed central analytical

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mechanism of the most minute intervals of time, *i.e.* not merely of the vibrational frequencies of the notes from 20 to 30,000 per second, but even of differences in vibrational periods of those notes which are much more minute quantities. Now the measurement of time intervals is in the essence mechanical. Time intervals have always to be converted into measurements of length before they can be estimated. The measurements of length may be those of distances travelled by a uniformly moving body, or of distances travelled by a body with uniform circular motion, or of a body performing harmonic vibrations (which is the linear component of uniform circular motion). This latter method is the most convenient in practice, consequently all our instruments for measuring time depend on harmonic vibrations, *e.g.* the sun's motion as measured on a dial, the pendulum of a clock, the balance wheel of a watch, the tuning-fork in timing physiological experiments; and, for those who accept the resonance hypothesis, the harmonic vibrations of the basilar fibres of the cochlea for measuring the minute periods of sound waves. No one, so far as the writer is aware, has attempted to explain the nature of a central nervous mechanism capable of measuring these periodicities. The advocates of "central analysis" have been content with saying, in effect, that if it cannot be explained at least it cannot be disproved. The only suggestion that has been made, is that there may be central nerve tracts, each "tuned" to the transmission of stimuli of a particular frequency.<sup>13</sup> But how could such tracts be developed? Only through association with some mechanical apparatus capable of applying stimuli of that particular frequency, and no other. In the transverse fibres of the basilar membrane, we have such a mechanical apparatus based on harmonic vibrations. The hypothesis of "central analysis" of sound leads no further.

The contentions put forward by the writer may be briefly summarised as follows:—

(1) The fibres of the basilar membrane are differentiated progressively for length, tension, and mass.

(2) Their vibrational frequencies, therefore, range continuously over a considerable scale.

(3) This differentiation can only be explained by crediting the basilar membrane with the function of analysing sound by sympathetic resonance.

# Analysis of Sound by Resonance

(4) A membrane so differentiated cannot be made to function in any other manner than by sympathetic resonance.

(5) Analysis, as effected by the basilar membrane, is imperfect. Corrections within the central nervous system have to be applied to the results. For these corrections we have analogies in sense of touch and sight.

(6) The measurement of small intervals of time, e.g. periodicities of sound waves, can only be made by mechanical means. "Central analysis" of sound is inconceivable.

My warmest acknowledgments are due to Professor J. B. Leathes, F.R.S., head of the Physiological Department at the Sheffield University for affording me laboratory accommodation and every facility for carrying out my experiments, for the kind and stimulating interest he has taken in my work, and for the valuable suggestions he has made from time to time. He has also done me the great favour of placing the assistance of his laboratory engineer, Mr C. E. Stewart, at my disposal. Mr Stewart has made the parts of the model from my scale drawings with great accuracy and skill.

I am indebted to Professor J. R. Milner, F.R.S., for reading my manuscript and criticising it from the physical standpoint.

REFERENCES.—<sup>1</sup> Cf. Luciani, *Human Physiology*, vol. iv., p. 236. <sup>2</sup> Ellis's *Translation of Helmholtz Tone-Perception*, 3rd edition, p. 148. <sup>3</sup> *Journal of Laryngology and Otology*, December 1921, and *British Medical Journal*, vol. ii., 1920, p. 859. <sup>4</sup> A. A. Gray, *Journal of Anatomy and Physiology*, 1900, vol. xxxiv., p. 324. <sup>5</sup> *Journal of Laryngology and Otology*, December 1921. <sup>6</sup> Ewald, *Pflüger's Archiv.*, vol. xciii., 1903. <sup>7</sup> A. Lehmann, *Folia Neurobiologica*, 1910, pp. 4, 116-132; cf. H. I. Watt, *Psychology of Sound*, p. 160. <sup>8</sup> *Loc. cit.* <sup>9</sup> Hardesty, *American Journal of Anatomy*, 1908, vol. viii., p. 109. <sup>10</sup> Wrightson and Keith, *Analytical Mechanism of the Internal Ear*, p. 205. <sup>11</sup> Emil ter Kuile, *Pflüger's Archiv.*, 1900, vol. lxxix., p. 140. <sup>12</sup> *Jenaische Zeitsch. f. Naturw.*, vol. lv., p. 539; cf. E. Budde, *Mathematische Theorie der Gehörsempfindung*, 1920, p. 187. <sup>13</sup> Cf. Budde, *loc. cit.*, p. 188, and L. Hermann, *Pflüger's Archiv.*, vol. lvi., p. 494 (1891).

# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF LARYNGOLOGY

May 5th, 1922.

*President*—Sir WILLIAM MILLIGAN.

**Papillomata of Larynx**—Dr FREDERICK SPICER.—Male, aged 46, was shown twenty-four years ago at a Meeting of the Laryngological Society. After several operations, extending over four years, he remained free from trouble until four years ago when the growths reappeared.

The PRESIDENT suggested removal of as much as possible by the indirect method, followed by irradiation of the area. He showed a laryngeal apparatus which he used for this purpose. After tracheotomy the radium tube, or its emanation, was placed *in situ*, for twenty-four to thirty-six hours, according to the severity of the case.

Mr NORMAN PATTERSON asked whether the President had experienced sloughing of cartilage after the application of radium in such cases. He had had one case with very severe sloughing. What dose of radium was advisable in these cases?

Sir JAMES DUNDAS-GRANT referred to the beneficial effect of applications of alcoholic solutions of salicylic acid after removal of the growths by instrumental means.

Mr DAWSON had used the galvano-cautery in preference to forceps in three cases.

Mr PARKER enquired whether radium was applicable to children, and if so, the length of time it could be safely left in position.

The PRESIDENT said he considered sloughing of cartilage was not a great risk if the amount of radium employed was reasonable and exposure not overdone. For a soft structure, the dose of radium need not be large, but in an old-standing case larger doses were advisable because of the thickening of the submucous tissues. He appreciated the value of salicylic acid, but rarely had recourse to it since he had employed radium.

**Papilloma of the Right Laryngeal Ventricle with Blood Cyst of Vocal Cord**—JAMES ATKINSON, M.B., C.M.—Female, aged 49, seen 1st March, with increasing hoarseness for one year. A smooth, rounded, bluish-red swelling concealed the anterior third of the right vocal cord. On removal with forceps the cyst collapsed and a small amount of blood exuded. A week later the voice had become clear and resonant. Protruding through the right ventricular orifice a small, reddish, firm-looking tumour was now seen, which disappeared into the ventricle on full adduction of the cords. Following two



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unsuccessful attempts at removal, owing to the tumour slipping away from the forceps and out of sight, the forceps blades were introduced sideways into the ventricle, and the growth, attached by a narrow pedicle, was removed.

Professor S. G. SHATTOCK reported that the tumour was a soft fibroma.

Dr IRWIN MOORE suggested that the tumour might possibly be an angio-fibroma. In his recent review on "Angieiomata of the Larynx" he had classed blood cysts under atypical cases. In the present case there might be some relationship between these two tumours, *i.e.*, a dilated blood-vessel (cyst) and a papillomatous growth developing later into an angio-fibroma. If so, it was fortunate that it had been removed in its early stage.

Dr KELSON thought there was only one growth which originated from the ventricle, and was partially removed at the first operation. He considered that increasing hoarseness for one year was a sufficient reason for removing a growth, and that in this case the procedure was more than justified.

Mr CYRIL HORSFORD thought the first swelling was merely a submucous hæmorrhage accompanying the original tumour in the ventricle. He asked whether the patient had increasing hoarseness as an explanation of the hæmorrhage.

Mr ATKINSON replied that following a year's hoarseness he removed the ventricular growth because of its liability to grow. The cyst had no connection with the ventricular tumour. There was no history of previous injury to the larynx.

**Intrinsic Epithelioma of the Larynx following a Laryngo-Fissure**—Sir ST CLAIR THOMSON.—Patient was shown to the Section on 2nd December 1921, with an infiltration of the left cord. A laryngo-fissure, with removal of the left thyroid ala, was performed on 3rd December. The growth proved to be a squamous epithelioma.

The PRESIDENT, having seen the operation, said he was impressed with Sir St Clair's procedure. He asked in what proportion of cases Sir St Clair had not removed the cartilage, and how the after-histories compared with those in which the cartilage had been removed. He asked this because it was very desirable that the Section should be given a lead on the matter. He (the speaker) had had several cases in which he had not removed the thyroid ala, and the patients had been free of the disease for many years. Recently he had seen a patient on whom he had performed laryngo-fissure five and a half years ago, without removing the ala, and there had been no recurrence until three months previously. Re-operation showed that the thyroid ala was involved by the disease.

Mr NORMAN PATTERSON reminded members that the partial removal of the thyroid ala was introduced into this country by Dr Lambert Lack.

Mr WRIGHT said that some operators removed the thyroid ala with the growth; others elevated the growth from the cartilage and then

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removed the cartilage. It seemed better to remove the growth and cartilage *en masse*, and he would like to hear opinions.

Mr HERBERT TILLEY said he could recall five cases alive at least ten years after he had performed laryngo-fissure. If the disease was recognised early, it was unnecessary to remove the ala, as the growth had not then extended deeply towards the thyroid cartilage. But if, during the operation, a deeper involvement was evident, the cartilage should be removed with the growth. He would be largely guided as to procedure by the rapidity of the growth and involvement of the surrounding area. He referred to a case of malignant disease of the larynx of eight years' standing which had been seen successively by Mr Butlin, Sir Felix Semon and Mr Charters Symonds before the patient came to him (the speaker). The former observers doubted its malignancy, but on operation the growth had all the appearances of epithelioma both macroscopic and microscopic.

Mr DIGGLE said that in some cases the cartilage was involved and had to be removed. If removed and recurrence took place, it was the perichondrium which was generally affected. He asked as to the percentage of recurrences in Sir St Clair Thomson's cases since he started removing the ala.

Mr ARCHER RYLAND remarked that apart from the importance of eradication of the whole disease in these cases, there was the question of laryngeal patency to consider in connection with the removal of the thyroid ala. It had been his experience, in examining these cases after operation, to find that in those instances in which the ala had been left intact, there was nearly always an undesirable degree of laryngeal stenosis, but when the ala had been freely excised an excellent air-way resulted. This fact alone seemed to him a sufficient reason for the removal of the thyroid ala.

Mr E. D. D. DAVIS maintained that if the thyroid ala was excised, a better access to the seat of operation was obtained, also the growth could be removed more freely and any bleeding point more easily secured. The thyroid ala if left stripped of its perichondrium was a source of sepsis and occasional necrosis.

Dr W. HILL, referring to the patient mentioned by Mr Tilley, said it was improbable that a case which had lasted eight years was malignant all the time. He knew of one patient treated by radium who survived six and a half years, also another who lived five and a half years without any treatment. The rate of growth of malignant disease of the larynx varied greatly.

Sir ST CLAIR THOMSON (in reply) said he did not in his early cases remove the thyroid ala, thinking that if this was done the side of the larynx would collapse, followed by stenosis. But since he had removed the ala a much freer glottis resulted. In the first 30 cases he did not remove the ala; in the last 20 he had removed it. It had been suggested that the ala, if left, acted as a barrier against the spread or recurrence of the disease; but he thought it was the perichondrium and not the cartilage which might limit the growth. An unvascular piece of cartilage left after removal of the perichondrium must take weeks, even months, to granulate over smoothly. Removal of the ala gave more room at the operation, a larger glottis after-

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wards, and, he thought, a better voice, and there was quicker healing and less sepsis. If recurrence did take place, he did not think a second laryngofissure was of any use, and laryngectomy offered the only chance for the patient.

**A Rare Bony Tumour (Compact Osteoma) of the Left Tonsil**—Mr TILLEY.—Miss T., aged 30, complained of a swelling in the region of the left tonsil which had been present as long as she could remember. Her chief symptom was pain at the base of the tongue, on the left side, caused by that organ rubbing against a “rough spot” on the swelling.

Examination revealed a swelling, the size of a walnut, which occupied the region of the left tonsil, and was covered with smooth normal mucous membrane except for an area the size of a threepenny-bit on its anterior surface. This was of a bluish-grey colour, and felt like bare cartilage. The tumour was hard and only slightly movable on digital examination. The tumour was enucleated intact. Posterior rhinoscopy showed that the lower half of the circumference of the cartilaginous portion of the Eustachian tube was absent.

Mr HOWARD MUMMERY reported that the tumour showed no dental structures, and was composed of dense bone of very close texture.

The PRESIDENT said he had never seen any case like the present one, and thought that the tumour represented vestigial remains in connection with one of the visceral arches.

Mr TILLEY mentioned that Sir John Bland-Sutton had never seen anything similar, and thought that the small hard nodule on the specimen suggested a tooth, and therefore that it might be an odontome. He (the speaker) thought that it might be ossification of a piece of cartilage from the third branchial cleft. The nearest approach to this specimen were the islands of cartilage and bone in tonsils, described by Mr Wyatt Wingrave in 1898.

Dr IRWIN MOORE considered that the case was practically unique; and believed that no bone tumour as large as this had previously been recorded. The transformation from cartilage to bone has been observed in the tonsil, not only in adults, but in children. The notes of the case show that the lower half of the circumference of the cartilaginous portion of the Eustachian tube was absent. The process of the tonsil being in close relation and dorsal to the first branchial cleft, which formed the Eustachian tube, suggested the probability that the tumour originated from a portion of cartilage forming the Eustachian cushion, which had become isolated in the closure of the branchial cleft and later been converted into bone.

Sir JAMES DUNDAS-GRANT suggested that Professor Hobday might throw light on the case, since horses, sheep, and goats had extraordinary osseous growths in connection with the pterygoid bone, usually aberrant tooth structures.

Mr VLASTO mentioned that he had at the present time under his care a young woman with a hard swelling, as large as a golf ball, occupying the

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region of the left tonsil. He proposed enucleating the tonsil by dissection with the hard substance enclosed.

Dr W. HILL suggested that from the position of the tumour, the term epi-tonsillar or palatal was more applicable to this case.

Mr TILLEY (in reply) said the patient had informed him that he (the speaker) had seen her previously at the age of 8 years, and he advised that the tumour should be left alone. It was situated above the tonsillar fossa, and he was only prepared to say it was "in the region of the tonsil." The partial loss of tissue of the palatal arch was not due to the operation, but was caused by the tumour.

**Malignant Disease of the Soft Palate; Removal by Simple Excision; Preliminary Ligature of the External Carotid Artery**—Mr ARCHER RYLAND.—Male, aged 59, first seen February 1922, complaining of a growth in the throat for fifteen months. Examination showed a neoplasm of the right soft palate, extending mesially as far as the middle line, and entirely confined to the right half of the soft palate. Palpation showed deep induration for some little distance into the substance of the left velum. An area of healthy uninvaded tissue intervened between the growth and the hard palate, and between the growth and the right fauces. There were no palpable glands.

Microscopical sections showed "An endothelial sarcoma, or a lymphosarcoma, extremely malignant."

Operation: Ligature of the right external carotid artery. Excision of the whole of the soft palate. Enucleation of the right tonsil.

The PRESIDENT thought the result in the present case was very good, but he wondered whether a dose of radium would not have been useful.

Mr HOWARTH considered that removal by the diathermic cautery knife would have been much better, and that excision of malignant growths of the mouth by the knife should be given up in favour of the diathermic cautery. He had had cases of recurrence following the removal of the original tumour by the knife, but when the diathermic cautery was employed there had been no recurrence over a long period.

Mr NORMAN PATTERSON pointed out that the patient had an enlarged and very hard gland on the right side of the neck. In these cases he advocated removal of all the glands on both sides of the neck, whether they were obviously affected or not.

Mr WOODMAN asked if the exhibitor had a scheme for the plastic repair of the palate, since something of the kind was very desirable. He suggested that by turning the muscular tissue in from the pterygoids, some kind of mobile palate could be improvised.

Mr E. D. D. DAVIS said he had kept in touch with five cases in which he had removed the greater part of the soft palate for epitheliomata. The local result was excellent and there was no recurrence, but secondary growths occurred in the cervical glands on both sides in the interval between

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the mastoid and angle of jaw, and so high up that they could not be reached. He had been in the habit of using the clamps which Dr Irwin Moore employed for the thyroid isthmus in laryngo-fissure, and the soft palate could then be removed with very little hæmorrhage. In two cases those clamps were in the way, and so he excised the growths without, and yet there was but little hæmorrhage.

Mr RYLAND replied that although in this case he ligatured the external carotid artery, events showed it to have been unnecessary. If the necessity arose in future cases, he would favour temporary clamping. There was, in his experience, one objection to diathermy where precise excision was needed, viz., the marked interference with the sense of touch due to the weight or dragging of the connecting wires of the apparatus. He had for this reason excised with the ordinary knife in this case, and thought he had some grounds for satisfaction at the result. In reply to Mr Woodman, he did not contemplate doing any plastic operation for the restoration of the soft palate, for the result of any such procedure must necessarily be very uncertain, but he expected that it would be within range of the dental surgeon's skill to supply the patient with a suitable artificial velum.

**Foreign Body in the Nose; Two Cases of Impaction of Bickerton's Style in the Nasal Fossa.**—Mr HAROLD KISCH and Mr ARCHER RYLAND:—

CASE I.—H. K., adult, female. The style had been in position for twenty-four years and had caused little inconvenience. She came to the hospital, however, because there had been some soreness about the eye and the epiphora had increased. The style could not be felt lying within the nose. An ophthalmic surgeon had attempted to remove the instrument and had failed. Operation: It was found necessary to make an external incision. The sac was opened and the style easily removed. It had slipped a short distance down the duct. Recovery was uneventful.

CASE II.—A. R., adult, female. The instrument had been inserted into the lacrymal duct six months before I saw this patient. It has since caused very considerable trouble. An ophthalmic surgeon had made an unsuccessful attempt at removal. The patient has had distressing nasal symptoms, discharge, and discomfort, but has not attributed these to the presence of the foreign body in the nose. Of late she has been under frequent treatment for her "nerves" and for "neurasthenia." On anterior rhinoscopy the body was easily recognised and removed. Moderation and then total relief of all symptoms followed. The "neurasthenia" entirely disappeared, and with it all necessity for further "nerve" treatment. It was notable that her former appearance of worry and ill-health was rapidly followed by one of cheerfulness and vigour. These facts are mentioned because the case affords rather a striking instance of the influence of a nasal affection on the nervous system and general mental balance.

**(A). Endo-bronchial Mirror**—Dr IRWIN MOORE.—An adjustable magnifying mirror for employment with the bronchoscope in the direct examination of the lateral lobe bronchi. Especially applicable for

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examination of the right upper lobe bronchus (since it is out of the direct line of vision) in cases of impaction of foreign bodies.

**(B). Endo-laryngeal Mirror**—Dr IRWIN MOORE.—An adjustable magnifying mirror for the direct laryngoscopic examination of the sub-glottic region. As expressed by members at the meeting of the Section on 4th November 1921 (Opinions of Sir St Clair Thomson, Dr W. S. Syme, etc.), difficulty has been experienced in the past of ascertaining by direct or indirect laryngoscopy the seat of origin of sub-glottic growths, or the extension of malignant disease below the vocal cord. This mirror, adapted from Michel's post-nasal mirror, can be adjusted to any angle, and may be passed through a direct endoscopic tube between the vocal cords, and the sub-glottic region—which has hitherto remained hidden, since it is outside the direct line of vision—may be thoroughly examined.

The PRESIDENT thought these mirrors were capable of being of considerable value, though the difficulty would be in focussing upon such a small mirror and at such a distance.

Dr IRWIN MOORE replied that the mirrors were supplied with powerful magnifying glass, and the endo-laryngeal mirror he recommended should be used through an ordinary short (Killian) tube, inserted between the vocal cords. A deep anaesthesia with open ether was necessary.

He had not yet had the opportunity of using the bronchoscopic mirror. It was designed for the search of a foreign body, such as a pea, impacted in the upper right lobe bronchus, the only indication of the presence of a foreign body being pus emanating from a bronchus out of the direct line of vision.

**Removal of a Fibroma of the Larynx by Mackenzie Forceps and Nasal Snare**—Mr E. D. DAVIS.—Male, aged 52, complained of hoarseness of fourteen days' duration, following a bad cold. A pale, smooth-looking polyp, about the size of a large cherry stone, was seen to be attached to the right ventricular band by a broad pedicle. After failure in removal with forceps, at Mr Vlasto's suggestion, a Mackenzie forceps was slipped through the wire loop of a Lermoyez nasal snare, the polyp was pulled upwards with the forceps, and the snare was then slipped over the base of the polyp; a piece of the ventricular band and the polyp were easily removed.

Sir ST CLAIR THOMSON, Dr W. HILL, Dr DONELAN, and Mr HUTCHISON referred to the dangers of employing an intranasal snare, since it might become jammed, or the wire caught in a growth, so that neither the snare nor the growth could be removed.

Sir JAMES DUNDAS-GRANT and Mr WYLIE regarded the snare as a valuable instrument, especially for pedunculated growths in the anterior commissure.

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Mr E. D. D. DAVIS (in reply) pointed out that in the snare he used the tube had no bridge at its distal extremity, so that the wire could be drawn up into the tube and was bound to cut through a polypus. He used a wire of No. 5 gauge.

**Carcinoma of Deep Pharynx removed by Lateral Pharyngotomy**—Mr WALTER HOWARTH.—Mrs M., aged 45, had complained of discomfort on swallowing with some pain for a few months. When seen (September, 1921), bismuth fluid passed without apparent obstruction, but the bismuth capsule could not be swallowed. Œsophagoscopy revealed a shallow ulcerated growth on the posterior wall of the deep pharynx, which extended almost into the œsophageal opening. Lateral pharyngotomy revealed the growth extending somewhat more laterally and deeper than was thought, so that thorough removal entailed the complete severance of the œsophagus from the pharynx. The gap measured about  $1\frac{1}{2}$  in.; an end-to-end anastomosis was made between the upper end of the œsophagus and the large irregularly cut edge of the deep pharynx. Pharyngeal musculature and other available tissues were used to reinforce the sutured area. Though the wound in the neck healed normally, and the tracheotomy tube was removed on the tenth day, fifteen days after the operation the patient collapsed severely, and passed a pint of dark blood per rectum and another half pint next morning. The œsophageal feeding tube was then removed. The melæna diminished and disappeared, but a few days later some lung symptoms developed on the right side, and a purulent pleural effusion was aspirated and found to contain streptococci in pure culture. As a result of the coughing and expectoration, the tracheal wound broke down again but healed finally in a few days.

Five months after operation solid food can be swallowed, but only with great care and some difficulty. Laryngoscopic examination shows no sign of the operation, as this was below the field of vision. Frothy mucus is seen in the post-cricoid region. This may be due to stenosis consequent upon the operation, or it may be due to impaired neuro-muscular co-ordination. Future œsophagoscopy will, however, decide this.

The PRESIDENT said there remained some slight stenosis, but it might be only fibrous. A very valuable suggestion in the record of the case was the retention of the feeding tube for considerably longer than was the general custom. He had himself been in the habit of removing it in five or six days, but he was now sure it was too soon. There was much still to be done in regard to these operations, and Mr Howarth had shown how much was possible.

Mr WOODMAN referred to the œsophageal tube as the most vulnerable in the body. He thought some further details of this case would help the Section, and encourage members to persevere in their efforts. He asked in what position the head was placed following the end-to-end anastomosis of

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the œsophagus. Also, how the head was fixed, whether in a mechanical appliance, or by means of a plaster bandage round the neck. Absolute immobility of the œsophagus after suture would be very desirable. He asked, further, what form of suture was used, whether interrupted, or continuous, and what form of external drainage. The speaker always used external drainage, but had not succeeded in inducing the œsophagus to heal up without leakage.

Mr HOWARTH (in reply) said he had never had any trouble with the nasal feeding tube in previous cases, but in this case apparently the irritation of the tube gave rise to some bleeding from the gastric mucosa on the fifteenth day and he had to remove the tube.

The patient was not placed in any particular post-operative posture; the neck was very firmly bandaged, and no mechanical appliance was employed. The œsophageal wall was sutured with interrupted catgut mattress sutures. The only drainage was a Kocher's tube in the lower part of the wound.

### **Double Abductor Paralysis due to Myasthenia Gravis.—**

Mr WALTER HOWARTH.—The patient was shown at the March Meeting, and it was suggested that the condition was due to a bulbar lesion. The present diagnosis is based on the opinion of Dr Birley and Dr Buzzard, who find in addition to the laryngeal condition, marked loss of sustaining power in arms and legs, difficulty of hanging up his coat owing to dropping of arm, difficulty in walking owing to left knee giving way, extreme weakness of facial muscles in lower half of right face, regurgitation of fluids through nose and left palatal weakness, marked weakness of the right serratus magnus with winged scapula.

The PRESIDENT said that when the case was previously exhibited he was interested in the possible ætiology. He had excluded bulbar paralysis on account of the patient's age.

Mr WESTMACOTT agreed that the condition was myasthenia gravis. In 1913 he saw a military man, aged 31, with very similar symptoms which came on gradually, and whose voice used to fail when he went on parade. Sir David Ferrier diagnosed the case as myasthenia gravis, prescribed polyglandin, and reported that he regarded the prognosis as serious. Patient used to walk twenty miles on a Saturday afternoon and return very exhausted. When war broke out he accompanied his regiment to Gallipoli, where he gained the D.S.O., and later went to Egypt, where he had another attack. He (the speaker) recommended polyglandin again, and the patient got well. A feature of the case was that the patient had a "dropped" jaw, which he had to hold up. The disease also affected the muscles at the lower part of the ribs and diaphragm.

Dr DONELAN believed a prominent symptom of myasthenia gravis was ptosis, and that was absent in this case; also, the hand grip was good. The vocal cords were thickened, and it was doubtful if paralysis was present. Without a lesion of the recurrent laryngeal nerve there could be no abductor paralysis, and if there was, the case was not a myasthenia, which, as far as his recollection went, was not a paralysis at all, but



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impairment due to an infiltration of the muscular fibrils. A foul discharge was exuding from the back of the nose and the teeth were bad. He suggested the possibility of congenital syphilis, and recommended Mr Howarth to reconsider the diagnosis. There might be some malingering.

Mr WOODMAN recorded the case of a woman, aged 35, who appeared to have a "functional voice." There was double abductor paralysis. Her heart was flabby and dilated. On screen examination with a bismuth meal, the food was seen to pass quietly across the larynx and down the œsophagus. He sent her to a neurologist, who diagnosed myasthenia gravis and gave a bad prognosis. He asked whether such a patient was likely to die of septic pneumonia, or of cardiac failure.

Mr HOWARTH replied that the neurologists made the diagnosis, and he did not feel competent to question it. There was very definite weakness of the serratus magnus and palate, also of the lower half of the face. He knew of one similar case in which there was abductor paralysis of one side, which got well; with proper treatment he did not see why this patient should not get well too.

**Case of Naso-pharyngeal Fibroma involving the Left Maxillary Antrum and Side of the Nose; Removal by Moure's Lateral Rhinotomy**—Dr NICOL RANKIN.—A boy, aged 15, seen August 1921, complaining of obstruction of both nares, of gradual onset during the previous three months. On examination of the left naris, a firm reddish tumour was seen posteriorly which entirely filled the air-way, and had pushed the septum to the right so that breathing through that side was impossible. The tumour protruded through the left choana and almost filled the left half of the naso-pharynx. Here it presented a greyish-pink appearance, and was firm on palpation.

In August, the growth was removed through the nose; bleeding was profuse, but free respiration was established through both sides. In February 1922, recurrence had taken place, and there was swelling of the left side of the face and a dark shadow on transillumination. Lateral rhinotomy was now performed, and the tumour was found to occupy the left side of the nose and naso-pharynx, left antrum and the sphenomaxillary fossa. Bleeding was fairly profuse, but not alarming.

The pathologist reported that the tumour was a fibroma with angiomaticous elements in it.

The PRESIDENT suggested that in a case in which hæmorrhage was likely to be profuse and dangerous, diathermy should be employed two or three weeks before the major operation. This greatly reduced the size of the growth and the risk of hæmorrhage.

Mr NORMAN PATTERSON said that following his experience with radium he was inclined to give up cutting operations. In a boy under his care, who had a growth extending into the zygomatic and temporal fossæ, the only cutting he did was to remove a piece for microscopic examination. Radium and X-rays were applied, and the growth entirely disappeared. He had seen other cases cured by irradiation.

# Societies' Proceedings

## ROYAL SOCIETY OF MEDICINE—SECTION OF OTOTOLOGY

May 19th, 1922.

*President*—Dr A. LOGAN TURNER.

**A Note on the Resonating System in the Cochlea, with Demonstration of a Model, Illustrating the Action of a hitherto neglected Factor**—GEORGE WILKINSON, F.R.C.S.—  
(*Journal of Laryngology*, September 1922, p. 447.)

### DISCUSSION.

Professor URBAN PRITCHARD said this subject had always been interesting to him. He had never been able to see that the basilar membrane had anything to do with the appreciation of sound; first, because the fibres in it were not free, as one would expect them to be if they were to be used as vibratory agents; and secondly, because in the upper part of certain cochleæ there was no basilar membrane at all, but there was an organ of Corti.

Dr A. A. GRAY said that the demonstration was the most important contribution which had been made to the subject for years, and that this was the first time he had seen a satisfactory instrument illustrating the movements of stretched membranes in response to sound vibrations. Ewald, about thirty years ago, showed an instrument to demonstrate the subject in this way, but it was not very successful. Mr Wilkinson's model indicated the possession of not only great patience, but also great mechanical ingenuity. Many attempts had been made to disprove the resonance theory, but none had been experimental. Rutherford and Ewald had not succeeded. The present apparatus was the first to demonstrate the membrane vibrating in sympathy with harmonic vibrations; it was a great step forward in the solution of the problem concerning the action of the cochlea. Mr Wilkinson had shown what was the third factor in determining the movements of the basilar membrane; the two previous factors were the length of the fibres and the tension, and now there was added the factor of mass, which would correspond with the thickness of strings in air vibrations. These all pointed to analysis by sympathetic resonance. It was true that when he (Dr Gray) wrote on the subject in the year 1900, the Helmholtz theory was looked upon askance, and the "telephone" theory was holding the field. When it was found that there was no evidence that nerve impulses corresponding in frequency and character could be carried up nerves and analysed, the theory was abandoned. Now we were brought back to the view of sympathetic resonance as the means of analysis. Some writers had assumed that there were pressure patterns in the basilar membrane; but as he (Dr Gray) had pointed out,\* it had not been shown how a pattern could be formed except by sympathetic resonance.

Dr Gray wished to refer to a point which had some bearing on the matter,

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\* *Journ. Laryng. and Otol.*, 1921, xxxvi., 7, pp. 584-94.

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when Mr Tweedie had referred to the evolution of the cochlea :\*—It might be considered strange that this marvellous mechanism of sympathetic resonance was present in the cochlea, and that sound waves were analysed by this means. Regarded, however, from the standpoint of evolution, it would be surprising if there were any other method by which we could appreciate minute disturbances in the air. When animals were living in an incompressible medium, *e.g.* water, it would not matter much whether the movements of the particle were harmonic or not. But when the medium was changed from water to air, which was compressible, a different condition of matters arose, and, so far as he knew, it was only vibrations which were harmonic in character that could be carried any distance through a compressible medium without undergoing loss by dispersion, *i.e.*, vibrations in which the velocity of the particle varies with the sine of the angle which represents the time. That was the only way in which movement of small magnitude could be conducted to any great distance. Those animals, then, which could appreciate these harmonic vibrations were the most likely to survive. Mr Sydney Scott said, some months ago, that he had examined the hearing of amphibians, and had found response to a few low notes only, not to the higher notes. Therefore, with amphibians the power of response to harmonic vibrations was probably very slight. Why should not the frog and other amphibians respond to high notes if their basilar membrane was equally capable of perceiving notes high and low? Therefore, from the standpoint of evolution, so far from this view being an unlikely one, it was the most probable; he (Dr Gray) would be surprised if the analysis could be made in any other way than by means of sympathetic resonance.

He agreed with Professor Urban Pritchard that the fibres were not able to vibrate individually, but that did not constitute an objection to the theory. It did not matter so much whether the fibres vibrated separately; the important matter was the point at which the maximum amplitude of movement occurred. When pressing a pointed object into the skin, numbers of nerves might be stimulated, but one predominant stimulus at the point caused the others to be ignored.

Dr RITCHIE RODGER asked whether Mr Wilkinson found that he was compelled to enlarge the helicotrema in the model, and if so, whether a combination of the two theories would be found to meet the case. He presumed that the model demonstrated represented a stable condition between the scale, whereas in Nature there was the displaceable basilar membrane which, according to the opponents of the resonance theory, conveyed the vibrations. If there was a displacement membrane, there was no need for such a large helicotrema.

Sir JAMES DUNDAS-GRANT said a step had been taken in the same direction by Professor M'Kendrick, who had made a large model, to represent the scalæ of the cochlea; inside this model, at varying distances, he had placed flapping valves, "tuned" to certain periodicities. When he gave the appropriate number of impulses at the end corresponding to the fenestra ovalis, the attuned valve picked it up and vibrated in resonance

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\* *Proc. Roy. Soc. Med.*, 1922, xiv. (Sect. Otol.), p. 25.

## Societies' Proceedings

with this but not with other numbers. What Mr Wilkinson has now shown is one of the finest illustrations of science. Sounds had been shown to be analysed in the cochlea, but they had to be combined in the brain so that a compound sensation might be appreciated by the individual. The advance made by Mr Wilkinson was so great as to be almost staggering.

MR WILKINSON (in reply) said that he had received kind encouragement from Sir Arthur Keith, who had lent him sections, and had taken an appreciative interest in the model. He (Mr Wilkinson) had not seen Professor M'Kendrick's model, but had read a brief description of it. Reference had been made to the central function in analysing sounds. The analysis of sound was ultimately a matter of measuring short periods of time, and the measuring of time was essentially mechanical. There was no known way of measuring time except by reducing it to measurements of length by means of uniform motion; either linear, circular, or pendular motion. Thus the objection to the supposition that sounds could be analysed centrally was fundamental. He (Mr Wilkinson) considered that the central mechanism was concerned rather with synthetizing or blending simple sensations into perceptions, than with analysing compound sensations into their elements. He feared he had not made himself clear as to the helicotrema. In the model this was not relatively larger than in the cochlea, but when he started experimenting with the model he feared to make it sufficiently large, lest too much of the energy of the vibrations should be dissipated. He found, however, that unless it were made reasonably large, differential response was imperfect. In answer to Dr Gray's question as to whether there was any way of forming sound patterns except by resonance, Mr Wilkinson said he thought that no proof was possible. The inertia of the fluids had to be reckoned with, and this point had received insufficient consideration. Ewald's artificial cochlea misrepresented the basilar membrane in every particular; there was no differentiation in length, and the windows were placed in a haphazard relation to the basilar fissure. Whatever differentiation of tension there might be was fortuitous, such as might result from unequal contraction of the rubber film in drying. If one differentiated in a haphazard way one got haphazard results. The "travelling bulge" theories of Meyer and ter Kuile might serve for an elaborate analysis of a single wave impulse, but with a series of impulses it became resonance pure and simple. Only the section of the basilar membrane in tune with the period of the impulse would regularly make room for the fluid displaced by the thrust of the stapes.

## ABSTRACTS

### EAR.

*The Sensitivity of Normal and Defective Ears for Tones of Various Frequencies.* JOHN P. MINTON and J. GORDON WILSON. (*Proceedings of the Institute of Medicine of Chicago*, 1921.)

In this communication the writers summarise briefly the results they have obtained by testing the hearing of normal and defective ears with a new instrument, the "Audion Oscillator." In this instrument harmonic vibrations are set up in the discs of a telephone receiver by means of a "sine wave" current. The pitch can be varied for 100 to 5000 D.V. and the intensity controlled by a variable resistance. It is claimed that accurate comparison of the energy of the vibrations of different frequencies can thus be made, and the sensitiveness of perception estimated on an absolute standard; a highly desirable consummation, if attainable.

The results of the tests are rather startling. Two curves of relative minimal sensibility for normal-hearing individuals are given. They both show most extraordinary peaks at about 4000 to 2000 D.V., and in one case also a lesser peak at about 1000. It is difficult to see any functional significance in these very limited exaltations. The lower (1000) rise does not include the whole range of tones for speech, nor does the middle (2000) rise cover the range of characteristic upper partials of vowel sounds, whilst the upper and most marked rise lies above the range of the more useful tones. The authors assure us that they are not the result of resonance with the receiver, or in the air between the receiver and the ear. It is not, however, clear that the upper (4000 D.V.) rise is anything but "the unpleasant shrill note" which Helmholtz found in his own case about  $f'''$ , which is due to the reinforcement of that tone by the resonance of the column of air in the external meatus. The middle and lower rises in the curves are approximately the lower octaves of this note. It is rather difficult to suggest an explanation for them. The four curves given present a very intermittent character, the acuity of hearing being markedly depressed in sharply localised regions within the scale.

The conclusions drawn from them may be summarised as follows:—Tone perception must be carried out in the cochlea by special receptors arranged lineally in series, and there is a corresponding serial arrangement of nerve fibres distributed to these receptors. No doubt the authors' results do lend some support to their contention so far as they go.

GEORGE WILKINSON.

## Abstracts

*The Caloric Excitability of the Labyrinth.* BRUNO GRIESSMANN.  
(*Münchener Medizinische Wochenschrift*, Nr. 51, 68 Jahr.)

A number of experiments carried out by Griessmann upon people with normal labyrinthine excitability prove the existence of a sympathetic connection between the skin and the vestibular apparatus. They demonstrate further that the labyrinth may be regarded as a nerve apparatus possessing a very marked sensibility to heat and cold, and that the caloric reactions of the labyrinth may rather be attributed to this fact than to the secondary vasomotor (and lymph) phenomena put forward by Bárány and Kobrak.

The usual caloric reactions were obtained in a few seconds without any syringing, simply by inserting in the auditory meatus a piece of lint soaked in water at the required temperature, and, what was still more remarkable, by the placing of the hot or cold lint on the auricle or on the skin of the neck below the auricle. JAMES B. HORGAN.

*A New Vestibular Reaction.* ERNEST WODAK and MAX. HEINREICH FISHER. (*Münchener Medizinische Wochenschrift*, Nr. 6, Jahr. 69.)

The reaction is termed by the authors the Arm Tone Reaction, or for the sake of brevity A.T.R. It depends upon the fact that if the vestibular apparatus of a normal individual is in any way stimulated, as, for example, by syringing with water, there occurs an alternation in the subjective feeling of weight (*schweremfindung*) on the two sides of the body. This sensation arises during or soon after the cessation of syringing, according to the amount and temperature of the water used. One side of the body appears to become heavier and to sink down whilst the other seems to become lighter and more elevated, these sensations being more pronounced in the extremities. If now the individual be asked to close his eyes and to extend both arms horizontally before him, preferably in the position of pronation, it will be observed that the arm on the subjectively heavier side sinks whilst the converse applies to its fellow. The actual difference between the positions assumed by the arms is very different in individual cases and fluctuates between some centimetres and several decimetres.

The reaction is more evident in children and women, and endures from between fifteen to thirty minutes. During this time there often occurs a reversal, both subjective and objective, in that the arm which at first felt the heavier now becomes the lighter and rises, and that which was formerly the lighter becomes the heavier and sinks. This occurs with greater frequency if warm water be used. It does not follow that there is a complete reversal of the positions of the arms.

The reaction is subject to certain rules. If cold water is used the sinking is in the first instance on the syringed side, and if warm water

## Ear

be used the reverse. The phenomenon is also observed after stimulation by rotation and galvanisation, in which cases it is also subject to specific rules.

The authors allude to the relationship which exists between A.T.R. and the other known vestibular reactions, and enumerate some of the ways in which it should prove of practical importance. It could, for instance, be used to estimate differences in the functional activity of the two labyrinths. Owing to the length of time which it lasts the reaction can be sought for without further disturbing the patient after he has been examined for the usual labyrinth reactions. The reaction, being a very fine one, may be observed in cases in which neither spontaneous nystagmus nor spontaneous past-pointing exists and in which vertigo is the only symptom present.

Simulation can be excluded in carrying out the A.T.R., owing to the ignorance of the person examined of the fact that the lowering of one arm is accompanied by a simultaneous elevation of the other and that there are periodic reversals of the deviations.

The authors request that the A.T.R. should be given ample clinical trial so that the results of their initial investigations may be confirmed and elaborated. They have little or no doubt that in many cases its practical utility will be convincingly established.

JAMES B. HORGAN.

### *Observations, Clinical and Theoretical, on Railway Nystagmus.*

R. BÁRÁNY. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 3.)

The author evokes railway nystagmus by turning before the eyes of the patient a roller marked with black lines. He finds that in hemianopsia railway nystagmus towards the side of the hemianopsia fails to appear, while towards the opposite side it is obtained as usual. Its absence towards the side of the hemianopsia is due to the fact that at the instant when the first line disappears, the image of the second is projected on the blind area, and hence no movement of the eyes takes place.

In cases of spontaneous horizontal optical nystagmus due to defective vision, railway nystagmus could not be obtained in the direction of the spontaneous nystagmus. In some cases, indeed, it was found that in place of the expected railway nystagmus there appeared a nystagmus in the opposite direction, even when spontaneous nystagmus in the direction of the expected railway nystagmus was already present.

Railway nystagmus is the result of three impulses: (1) the fixation impulse; (2) the impulse to follow moving objects; (3) the rebound of the eye to fix the next object. The nystagmus appears to originate from the calcarine fissure, but not directly, as certain of the author's

## Abstracts

observations seem to indicate that the slow phase takes origin in the angular gyrus, and the quick phase in the frontal region.

Railway nystagmus is present a few hours after birth, and this suggests that nerve fibres are capable of functioning before they have become medullated. THOMAS GUTHRIE.

*The Relation of Labyrinthine Tonus to Muscle Tonus.* J. GORDON WILSON, M.D., Chicago. (*Journ. Amer. Med. Assoc.*, Vol. lxxviii., pp. 557, 562, 25th February 1922.)

The author reaches the following conclusions:—

1. Tonus is a plastic state of the muscle associated with the maintenance of normal attitude. (Postural tonus of Sherrington.)
2. This state is under the control of reflex nerve impulses, which automatically produce a modification of the muscle to maintain a particular attitude.
3. One source from which these reflex nerve impulses arise is the labyrinth.
4. These reflex nerve impulses, determining the amount of muscle lengthening and shortening, together with the degree of fixation, depend on antigravity impulses arising in the labyrinth.
5. The labyrinth is chiefly concerned with the maintenance of the attitude of the head in space. As a corollary, the labyrinth influences secondarily the muscles of the trunk and limbs.
6. The muscle proprioceptors are concerned with segmental posture. The labyrinth is concerned with total posture. So far as trunk and limb are concerned the labyrinth may be regarded as a mechanism superimposed on the segmental.
7. In the unilateral destruction of the labyrinth, the deviation of the eyes and neck is due to tonic activity of the other labyrinth.
8. The stimulation of the nerves in the labyrinth is due to mass movements of the otoliths and fluids in the canals.

The article provides an interesting survey of recent investigations, and should assist our knowledge of the very intricate and subtle physiology, pathology, and clinical application of the vestibular reflexes.

It is particularly gratifying to note that the work of Sherrington is as well recognised in America as it is by those in Utrecht who conduct research on the functions of the Otoliths. ALEX. R. TWEEDIE.

*Inversion of the Oculo-Cardiac Reflex in Cerebral Compression.* Dr JEAN GIROU. (*Revue de Laryngologie, etc.*, December 1921.)

The oculo-cardiac reflex is elicited by firm compression of the eyeballs backwards in the orbits. In normal individuals this produces an immediate slowing of the cardiac rhythm, amounting to 6 or 8 beats



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a minute. The slowing ceases immediately the compression is discontinued. The afferent path is in the trigeminal nerve; its efferent path is in the autotonic fibres of the vagus.

Several observers have noted inversion of the reflex (*i.e.* quickening instead of slowing of pulse) in cases of head injury. The writer reports three observations on cases of cerebral suppuration (2 cerebellar, 1 extradural abscess of middle fossa) in which a similar inversion of the reflex was found.

In one case the pulse rate was 40 and rose to 108 on compression of the eyeballs. Girou observed this case during an operation for evacuation of cerebellar abscess. During the emptying of the abscess the pulse rose to 70 and reflexly to 76. Shortly after, the pulse rate was still 70, but no acceleration resulted from compression of the eyes. After the operation the reflex became normal (80 and 60 respectively). Possibly this inversion of the reflex may prove a valuable addition to our diagnostic resources in cases of suspected abscess of the brain.

The explanation given by the author is as follows:—Normally the afferent impulse passes by the 5th nerve through the brain to the vagus. When cerebral tension is raised, the efferent path is blocked by those impulses from the brain which give rise to tachycardia, and the reflex efferent impulse is switched over to the sympathetic route, causing an increase of the pulse rate.

G. WILKINSON.

### *Contributions to the Study of Psychoneuroses in Oto-Rhino-Laryngology.*

Drs J. MOURET and CAZEJUST, Montpellier. (*L'Oto-Rhino-Laryngologie Internationale*, January 1922.)

1. *Facial Paralysis of Hysterical Origin*.—A female acrobat of 19, in the course of her performance, fell on the road, sustaining abrasions on her right arm and leg. She complained also of severe pain in her right ear. She had slight headache the same night, and the next day she presented herself at the ear clinic for examination. Save for slight ecchymosis in the postero-inferior quadrant of the tympanic membrane, the auditory apparatus was healthy and of normal appearance. She remained under observation for four days, during which time nothing occurred which was worthy of note.

The patient left hospital and soon afterwards met a person who expressed astonishment that she had not sustained facial paralysis as the result of her accident, enumerating, at the same time, the signs and inconveniences of this condition. In less than an hour after this conversation, the patient suddenly acquired a right-sided facial paralysis, which lasted for four or five days without improvement. She returned to the hospital, where examination with the aid of the electric current revealed the integrity of all branches of the facial

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nerve. Two treatments with faradism and one by suggestion resulted in a complete cure.

2. *Hysterical Mutism after Cauterisation of the Tonsil*.—The patient, a man of 28, was admitted to hospital for treatment of septic tonsils. He refused enucleation on account of the post-operative hæmorrhage, and some sittings by the galvano-cautery were arranged instead. Accordingly, under cocaine anæsthesia, the right tonsil was cauterised, the patient showing no nervousness at the time of operation. Four hours later, the nurse found him talking excitedly at the pitch of his voice to his neighbours. She ordered quiet, suggesting that he might bring on a serious hæmorrhage. He became quiet at once, and three hours later he found that he was quite unable to articulate or make a sound. Examination revealed slight œdema of the soft palate due to the cautery, and the vocal cords were found to be in the cadaveric position. The patient was informed that the condition was common after this operation, and that he would regain his voice before the morning. At 11 P.M., he was given milk which was designedly overheated, but this did not induce speech. Later on, however, the voice returned and was found to possess its normal tone. The patient submitted to two more sittings of the galvano-cautery without any untoward result.

GAVIN YOUNG.

## LARYNX.

*Surgical Anatomy of the Superior Laryngeal Nerve*. Dr PAUL CAZEJUST. (*Revue de Laryngologie*, January 1922.)

The nerve is attacked in the "thyro-hyoid quadrilateral" when it is necessary to divide it, or to destroy its conductivity by alcohol injection in cases of intolerably painful dysphagia.

This quadrilateral space is bounded in front by the thyro-hyoid muscle, above by the great cornu of the hyoid bone, below by the upper border of the thyroid cartilage, and behind by the lateral thyro-hyoid ligament.

The writer, as a result of thirty dissections, shows that the course and relations of the nerve are subject to many variations. It is rare that the nerve presents itself under two identical aspects. Frequently the nerve makes a decided downward curve at the bottom of the thyro-hyoid space. Its relations to the superior thyroid vessels are not constant. It is usually at the inner side of the vessels, but occasionally crosses from within, below and finally above them. Sometimes it interlaces with them. The great cornu of the hyoid forms no reliable guide to the position of the nerve. Frequently the nerve divides into two collaterals before entering the membrane.

# Larynx

These variations would account for the frequent failure of alcohol injections to hit off the nerve and interrupt its conductivity.

G. WILKINSON.

*Thrush of the Larynx.* LANGER, E. (Berlin). (*Arch. für Laryngol.*, 1921, Band 34, Heft 2-3.)

An ill-nourished infant, reported to have had an aphthous stomatitis with staphylococci but no thrush organisms (the term *Oidium Albicans* is not used, J.D.G.), began to run at the nose and cough, and died in a day or two with rapidly increasing difficulty in breathing. On post-mortem examination there was no sign of aphthous stomatitis, but on the middle of the inner segment of both vocal cords a white, fairly loose membranous exudation. The deposit contained quantities of gram-positive mycelial threads and conidia, and was evidently of the nature of thrush. The writer considers that the thrush had not developed primarily on the vocal cords, but had found its way there by "implantation-metastasis." The amount of erosion of the underlying epithelium was unusual. It is noted that thrush does not readily develop on ciliated epithelium unless that epithelium has become flattened by metaplasia. In this case the thrush seems to have selected the portion of the larynx furnished with squamous epithelium.

JAMES DUNDAS-GRANT.

*Papilloma of the Larynx in Children.* S. J. CROWE and M. L. BERNSTEIN. (*Archives of Surgery*, March 1922.)

Papilloma of the larynx in children, a disease as fatal as carcinoma of the larynx in adults, is fortunately not common. At Manhattan Eye, Ear, and Throat Hospital only eight cases were seen in fifteen years, and at Johns Hopkins Hospital only eleven cases in ten years.

The eleven cases just mentioned are fully reported in the present paper. The writers consider that an external operation is never justifiable in a child, as stenosis of the larynx is almost sure to follow. Tracheotomy is in most cases essential as a preliminary to further treatment. Cure following tracheotomy alone is rare, and is even denied by some authorities. Endo-laryngeal removal is the operation of choice, but the tendency to recurrence is well recognised, and repeated removals are necessary in order to effect a cure. The suspension apparatus is of great assistance.

After removal, various applications have been recommended, and diathermy has its advocates. Radium, in expert hands, is of undoubted value.

The case records accompanying this paper deserve careful study.

DOUGLAS GUTHRIE.

## Abstracts

*Surgical Treatment of Functional Stenosis of the Larynx.* SARGNON and J. TOUBERT. (*Annales des Maladies de l'Oreille, du Larynx, du Nez, et du Pharynx*, Vol. xl., No. 2.)

The authors in their papers deal with what they term "Functional Stenosis," and under this heading include cases of stenosis due to paralysis and those resulting from arthritis of the crico-arytenoid joint. As Escat said:—"The larynx may become inert as a result of neuropathy, myopathy, or arthropathy." As treatment, Sargnon advises laryngostomy, *i.e.*, suturing the larynx to the skin. Other methods are retrograde dilatation, resection of the superior laryngeal nerves, excision or incision of the vocal cords, arytenoidectomy. Hobday and Williams's operation of ventriculectomy as practised on horses is mentioned.

The authors' operation consists of a laryngostomy with a submucous resection of the two arytenoids and curettage of the two ventricles. The technique is as follows:—(a) Preliminary tracheotomy. (b) 1 per cent. novocain anæsthesia (local and regional) of the superior laryngeal nerves and of the larynx after exposure. Morphia before the operation. (c) Incision—from hyoid bone to lower border of thyroid cartilage. The edges of the endolaryngeal mucous membrane are sutured to the skin. (d) A single horseshoe-shaped incision is made just above the true vocal cords. (e) The arytenoids are separated and removed submucously, the vocal process being left intact. Then the intraventricular mucous membrane is stripped and cut flush with the margin. The ventricles may be curetted, and the cautery used to destroy any remnant tags. (f) The tracheotomy tube is left *in situ*, and the larynx packed for the first few days. Later, gradual dilatation is maintained by a drainage tube increasing in calibre. (g) The tracheotomy tube is removed later, and the wound allowed to heal. It may be necessary to do a plastic operation.

The advantages claimed for the method are as follows:—1. The vocal cords are left intact—their separation is effected by the cicatricial contraction of the ventriculectomy wound. 2. The enlargement of the larynx is in all diameters equal. 3. It is superior to laryngostomy followed by dilatation, because it allows one to dilate the larynx in which the mucous membrane is more or less intact and free from cicatrices. 4. Breathing and the voice are recovered at an earlier stage and more satisfactorily.

E. D. DALZIEL DICKSON.

## LETTER TO THE EDITORS

TO THE EDITORS,

*The Journal of Laryngology.*

SIRS,—The highly interesting Critical Review, "Various Theories of Hearing," which Dr Albert Gray contributed to the Journal in August 1921, leaves the matter in the hands of the physiologists to settle in the dim future. But it occurs to me that it may be possible to help matters a little by furnishing some cross proofs. I have had three cases of loss of sense of pitch which has been restored by treatment with the Electrophonoide, and these seem worthy of record. Presumably the sound-waves which it produces have more effect on the nearer organ, the cochlea, than they can have on the more distant organ, the brain, and this would therefore seem to support Dr Gray's theory that the analysis takes place in the cochlea.

A piano-tuner, an organ-tuner, and a violinist had lost their sense of pitch, which rendered them useless in their profession. The first, aged 29, served in the A.S.C.; a heavy battery suddenly opened fire close to him. He became quite deaf and suffered from what is generally known as concussion of the labyrinth. He gradually recovered his hearing, and in a few weeks thought nothing more about it. On being demobilised he returned to his work, but after a little he was told by his Firm that he could not be kept on as they were receiving complaints that he left the pianos more out of tune than he found them. As that meant losing his work, he applied to the Ministry of Pensions. After examination he was told that he could not receive a pension as he could hear quite well and there was no provision in the regulations for loss of sense of pitch, and he had better therefore change his profession. In this quandary he came to me and had a course of treatment with the Zund-Burguet Electrophonoide. Happily it was not necessary for him to change his profession as his sense of pitch came back completely.

The second case was that of the organ-tuner, aged 37, who suffered from chronic otitis media. He had been deaf for several years, but had got much worse during the last two years; he had also begun to have great difficulty in hearing whether his organs were in tune. His hearing was reduced considerably, as with his hand to his ear, he could only hear the loud voice at 1 foot on the right side and at 6 inches on the left. After a course of treatment he could hear a conversational voice at 16 feet on the right side and 12 feet on the left side and his sense of pitch was also restored.

The last case is that of the lady violinist, aged 42, suffering

## General Notes

from nerve deafness. When the war broke out she was engaged playing the violin in Moscow. She could not get out of the country and had been all through the horrors of the Bolshevist Revolution, being only repatriated by the British Government last year. About a year ago she began to notice that she couldn't hear in general conversation, nor on the telephone. About the same time she was told she was playing out of tune, a thing she had never done before. When she got to this country, she found the inability to hear when she was out of tune was a fatal bar to her getting any engagement. She was sent to me for treatment with the Zund-Burguet Electrophonoide.

When she came she could hear, on the right side, the voice at 10 feet and a whisper at 1 foot. On the left side she could hear the voice at 8 feet and a whisper at 1 inch. After a few treatments she could hear the conversational voice 23 feet with the back turned and a whisper at 2 feet and the sense of pitch came back so that she no longer played out of tune.

These three cases are especially interesting as they show that the sense of pitch is something apart from the sense of hearing, as the first case was not deaf, the second had chronic otitis media and the third nerve deafness.

GEORGE C. CATHCART.

## GENERAL NOTES

### THE SEMON LECTURE.

ON 12th July, in the Hall of the Royal Society of Medicine, The Semon Lecture for 1922 upon "The Development of Trans-Atlantic Rhinology" was delivered by Professor H. S. Birkett, C.B., Dean of the Medical Faculty, McGill University, Montreal. Mr H. J. Waring, F.R.C.S., the Vice-Chancellor of the University of London, occupied the Chair, and introduced the lecturer to an audience which numbered about seventy persons. In his most interesting and instructive address, Dr Birkett sketched not only the rise and progress of laryngology in the Western Hemisphere, duly emphasising the part played by the pioneers and leaders in the specialty in the United States, while modestly ignoring his own share in placing the subject upon an assured and recognised basis, but he related also what had been done in Canada and the United States in developing the education of the student of medicine and the specialist in this important branch. The vote of thanks to the lecturer was moved and seconded in felicitous terms by Sir James Dundas-Grant, K.B.E., and Sir St Clair Thomson.

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### BRITISH MEDICAL ASSOCIATION.

At the Annual Meeting of the British Medical Association, which was held in Glasgow from the 25th to 29th July, the Sections of Otology and Laryngology attracted large attendances. We hope to give a short account of the Proceedings in our next number.

# General Notes

## THE SCOTTISH SOCIETY OF OTOTOLOGY AND LARYNGOLOGY.

In order to supplement the somewhat short programme provided by the Single Day Sessions of the Sections of Laryngology and Otology at the Annual Meeting of the British Medical Association in Glasgow, the Scottish Society of Otology and Laryngology decided to hold a Special Meeting on Friday, 28th July. The arrangements, which were placed in the hands of the Glasgow members, who acted also as hosts, left nothing to be desired, and Dr W. S. Syme and his colleagues are to be congratulated not only upon the success of the scientific meeting, but also upon the very excellent provision made for the social entertainment of their guests.

On the evening of Thursday, 27th July, the members of the Society and the visitors from south of the Tweed and elsewhere enjoyed the hospitality of Dr and Mrs A. Brown Kelly, in their home at 26 Blythswood Square. On the following morning the Society met in the Ear and Throat Department of the Western Infirmary, where a number of interesting cases were shown by the President (Dr D. J. Connal), Drs A. Brown Kelly, W. S. Syme, John W. Leitch, and Dr W. C. Macartney. Prior to a discussion upon the same, Mr George Wilkinson, on the invitation of the President, demonstrated his model of the Cochlea and the Mechanism of the Sympathetic Resonance of Hearing, and a short paper was read by Dr Gavin Young upon "The Relations of the Optic and Vidian Nerves to the Sphenoidal Sinus."

Amongst those who took part in the Meeting other than the ordinary members of the Society were Professor Holger Mygind (Copenhagen), and Dr H. H. Forbes (New York), Sir James Dundas-Grant, Sir William Milligan, Sir St Clair Thomson, Dr P. M'Bride, Dr Dan M'Kenzie, Mr W. G. Howarth, Mr Lionel Colledge, Mr F. J. Cleminson, Dr Andrew Wylie, and Mr F. F. Muecke; Dr D. R. Paterson and Dr Jones (Cardiff), Mr A. J. Hutchison (Brighton), and Mr A. J. Wright (Bristol).

In the afternoon, members of the Society and their guests, accompanied by their wives, proceeded by train to Callander and thence by coach to Loch Katrine, where an hour was spent on the lake which,

"In all her length far winding lay,  
With promontory, creek and bay  
And islands that, empurpled bright  
Floated amid the livelier light."

Tea was afterwards served at the Trossachs Hotel, where the interesting ceremony of electing Honorary Members took place, under conditions and in an environment which enhanced the Society's Scottish welcome to her most recent recruits.

A. L. T.

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Sir James Dundas-Grant, K.B.E., Sir William Milligan, Sir St Clair Thomson, Dr Dan M'Kenzie, and Professor Holger Mygind (Copenhagen) have been elected Honorary Members of the Scottish Society of Otology and Laryngology.

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## SOME IMPRESSIONS THAT REMAIN, PARIS, JULY 1922.

On the left bank of the Seine, in the angle formed by the intersection of the Boulevards Saint Germain and Saint Michel, stands the École de

## General Notes

Médecine, one of a block of buildings which constitutes the School of Medicine of the University of Paris. Here, in the oldest part of the city, where through the centuries there had been gradually built up the Faculties of Theology, Arts, Science, and Medicine, the tenth International Otological Congress opened its sessions on the morning of Wednesday, 19th July. It was fitting that the modern exponents of two of the youngest branches of Medicine and Surgery should congregate in an environment so closely interwoven with the life and work of some of the greatest exponents of science and of the practice of physic in France, where Buffon and Cuvier, naturalists, Lavoisier, the chemist, Bichat and Broca, anatomists, Claude Bernard, the physiologist, Ambroise Paré, the surgeon, and Laënnec, the physician, established their world-wide reputation.

In the large amphitheatre attached to the School, M. Paul Strauss, the Minister of Health and the Rector of the University, extended to the members a cordial welcome to Paris, and after Professor Urban Pritchard, President of the Congress in London in 1909—whose presence on this occasion greatly gratified his confrères—had addressed the assembly, the scientific proceedings were commenced under the presidency of Professor Pierre Sebileau.

A very full programme, containing between 120 and 130 papers and several *rapports* of more than ordinary interest, had been provided by the indefatigable Secretary, Dr A. Hautant and the Committee of Organisation. It was evident that the President would require to enforce his authority by strictly limiting the period assigned to each speaker, if the schedule was to be carried through "according to plan." All will agree that Professor Sebileau discharged this unenviable task without fear or favour. We listened with admiration to the persuasive insistence of the tinkling note of his improvised bell—a tumbler and pen—as he bent to his will the erring speaker. We admired—perhaps too with a shade of envy—the courteous terms and the readiness of speech with which he invited, from time to time, one of his distinguished confrères, representatives of other countries, to share temporarily with him the duties of the Presidential office. While appreciating his devotion to duty, which was shared by his secretariat, we sympathised with him, as hour after hour he conducted the business of the sessions in an atmosphere which was rarely conducive to mental alertness, while the ordinary "man in the street" was free to come and go as the spirit moved him and to recuperate himself in the sunny courtyard or in a neighbouring café.

Notwithstanding the many attractions which Paris offers always to her visitors, and in spite of the brilliance of the summer days, the attendance at the various séances was well maintained. We are unable to chronicle any specially noteworthy scientific discovery. When the papers are published, however, and it becomes possible to study them at leisure, a better estimate will be arrived at as to the true value of the many contributions laid before the Congress. The tentative fusion of laryngology with the sister branch on this occasion, regarding the wisdom of which differences of opinion will certainly arise, produced a series of interesting *rapports* and a number of papers upon the "Treatment of Cancer of the Larynx." This furnished the Congress with what we might term its sole dramatic incident. It was provided by Dr Tapia of Madrid, the exponent of complete extirpation of



## General Notes

the larynx, when he brought on to the platform a number of patients from whom the whole organ had been removed, and when each, in turn, addressed the audience in a few distinctly audible sentences by the aid of the artificial apparatus with which they had been supplied. He was followed by Sir St Clair Thomson, who, in a similar manner, demonstrated the success of laryngo-fissure in the person of a British admiral, one of whose vocal cords he had removed five and a half years previously.

If we might venture to offer a criticism of the scientific programme of the Congress, we do so in no carping spirit, but rather with the object of safeguarding the success of future similar congresses. The large number of papers which had been accepted, on this occasion, tended to defeat one of the objects of such an international gathering, in that, from insufficient time, a full discussion both of the papers and of the *rappports* was of necessity rendered impossible. Many members would have liked to have expressed their views on more than one of the subjects submitted, had a fuller opportunity offered itself for them to do so. Might we suggest to future Committees of Organisation that certain regulations should be drawn up as a guide in the preparation of papers, indicating the lines which such might follow, and unless they conformed strictly to these they would not be accepted. The number of communications actually presented at the sessions should be definitely limited, the choice being made by ballot, while those which passed the Committee, but were unsuccessful in the ballot, would nevertheless appear in the volume of the Transactions of Congress. We must admit that while such a proposal presents difficulties, they should not be unsurmountable. Further, the attendance of an interpreter to analyse briefly each paper when read would materially assist those taking part in the discussions.

Social entertainment, both official and private, was provided on a generous scale, and we are grateful to our French hosts and hostesses for their delightful hospitality. Not only did the State, in the person of M. Strauss, recognise the meeting of Congress, but the Municipal Council of Paris joined in the welcome to the members and their wives at a reception held in the historic Hôtel de Ville. Rebuilt in French Renaissance style after its destruction in 1871, it maintains its original form, but on larger and more ornamental lines, while the salons and galleries show some of the best examples of the tasteful decoration of modern French Art.

On Wednesday evening we were the guests of the President and Madame Sebileau at a *soirée musicale* in the Hôtel Majestic, which, not so very long ago, had been the scene of the work and the recreation of the members of the British delegation to the Peace Conference. It was whispered, indeed, that the concert room, which, on that evening, echoed sweetly to the classic melodies of Chopin and Saint-Saëns, had reverberated each week to the din of the jazz band and to the merry-footing of the fox-trot and tango, when the hard-worked delegates and their staff sought distraction from their labours.

At the banquet in the Hôtel Continental, on Thursday evening, the French members of Congress proved ideal hosts in the entertainment of their confrères of the allied countries and their friends. With speech

## General Notes

and dance, the festivities were prolonged into the small hours of the morning.

On Sunday, 23rd July, the official programme had arranged for an excursion to Verdun, the epic of France's greatest heroism and sacrifice. To some of us, however, the battlefields of the Somme made a strong appeal, so leaving Paris by the *Rapide* on Saturday evening we journeyed to Amiens. Under lowering clouds and through mist and rain, a fit setting for a landscape which had so recently been the scene of the horrors of war, we motored throughout Sunday by villages and woods, whose names had become as familiar to us as household words.

In the days to come, when the vivid impressions of Paris during Congress week, full of life and movement under a brilliant July sun, have faded from our minds, the picture, beneath a leaden sky, of the shell-pitted fields of Picardy, and the desolation of areas of rolling country, now happily showing signs of renewed vitality; the fragments of scarred and stunted trees raising a few leafless branches to the void; the tragedy of the villages of France and the countless rows of little wooden crosses, marking the last resting-place of many a known and unknown British soldier will long remain a haunting memory.

A. L. T.

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At the meeting of the Otological Congress in Paris, Dr Luc's numerous friends were delighted to see him restored to health and again in active work. As usual, his linguistic talents were much appreciated during the Congress.

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### ELEVENTH INTERNATIONAL OTOLOGICAL CONGRESS.

At the recent meeting in Paris, it was unanimously agreed that the next International Meeting of the Congress of Otology should be held in Copenhagen in 1925, under the Presidency of Professor Schmiegelow. It was left to the decision of the profession in Denmark to settle the most convenient time of the year, and the Danish Organising Committee were given the option of postponing the meeting of Congress if they thought fit.

It was arranged that Laryngology should be included in the next Congress.

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Mr Donald Watson, M.B. Edin., F.R.C.S. Eng., formerly Clinical Assistant and Clinical Tutor in the Ear and Throat Department, Royal Infirmary, Edinburgh, has been appointed Honorary Aural Surgeon to the Eye, Ear, and Throat Infirmary, Bradford.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## SCARLET FEVER OTITIS

*Report on Two Years' Work at the Edinburgh City  
Hospital for Infectious Diseases.\**

By W. T. GARDINER, M.C., F.R.C.S.E., Assistant-Surgeon, Ear and Throat Department, Edinburgh Royal Infirmary.

As the result of direct representation by the Scottish Society of Otology and Laryngology to the Public Health Committee of the Edinburgh Town Council, the latter body, in March 1920, appointed an Otologist to the hospital. His duties were to be as follows:—(1) To visit the hospital three times per week; (2) to see all cases in which ear symptoms were reported; (3) to instigate such treatment as he thought advisable and necessary for these ear cases, with a view to cutting short the otorrhœa and preventing the subsequent chronicity.

As by far the larger number of infectious cases in the hospital are scarlet fever, an operating theatre was arranged as centrally as possible in the scarlet fever block.

### Method of Working.

The hospital is visited every Tuesday, Thursday, and Saturday at 10 A.M. Each ward is visited and inquiry made of the Sister in charge as to patients showing, or suspected of having, some ear condition. Fresh cases arising since the previous visit are examined, and the old ones re-examined as to progress. Old cases are not re-examined at every visit unless showing signs of extension of the disease, or other

\* Read at the Fifteenth Meeting of the Scottish Society of Otology and Laryngology, 10th June 1922.

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noteworthy feature. Notes are kept of all cases from the commencement till the patient is discharged from hospital.

In serious cases the visits are not limited to three per week, and the otologist is always at the call of the superintendent if necessity arises.

Special attention is paid to the mode of onset of the ear condition, as to temperature, pain, and headache, and character of the discharge, if any. The local appearances are also noted at the first and subsequent examinations.

Operations on scarlet fever patients are carried out in the theatre in the scarlet fever block; those on diphtheria patients in the diphtheria theatre; and the operations on measles and whooping-cough cases are performed in a side-room of the Sections.

In this paper it is proposed to deal only with scarlet fever cases, ear complications arising in the other exanthemata being too few to afford any real comparison.

**Percentage of Cases:**—In the year 1920-21, 158 cases were examined out of a total scarlet fever admission of 1524, *i.e.*, 10 per cent.

In 1921-22, 142 cases were seen out of 2204 admitted, *i.e.*, 6 per cent.

**Date of Onset:**—*At what Stage of the Fever is Otorrhœa most likely to arise?* In the year 1920-21, the week of onset was noted 136 times in 158 cases. The figures for the consecutive weeks show the first week to be the commonest period in which ear symptoms arise, *viz.*, 42 times; the second, 27; and the third week, 23. The fourth and fifth weeks are almost equal with 16 and 14 respectively. Thereafter the incidence falls to 7 in the sixth week.

In 1921-22, out of 142 cases seen, 40 occurred in the first week, 37 in the second, 18 in the third, and 11 in the fourth. It will thus be seen that the otorrhœa commences most frequently during the first three weeks of the illness, with a marked inclination in the direction of the first week. Nineteen cases had ear discharge on admission; these are included in the first week.

**Symptoms:**—*Pain; Temperature; Discharge.*—Otalgia, when present, is a reliable signal of ear mischief, although it is not absolutely infallible. It has, on several occasions, been due to petrosillar abscess. On a few occasions, impacted wax was the only finding. Ear discharge occurred, however, twice as often without pain as with it. And this has led to the

# Scarlet Fever Otitis

observation that in the early stages—first and second week—pain is usually complained of, but in the later stages, from the third week onwards, pain is seldom experienced. More will be said of this later, under Adenoids (p. 501). With pain there is usually temperature. As the temperature is of more interest in connection with the presence or absence of mastoid complications, it will be dealt with in that section (p. 502).

*Character of the Discharge.*—In the majority of cases the discharge was purulent—44 and 33 in the respective years. Twenty-nine times it is described as mucoid or consisting of thick mucus.

Several times the discharge is noted as having a foul odour. Where there is no previous history of discharge (as ascertained by questioning the parents), and from my experience of otitis in diphtheria cases, I now associate the foul odour with diphtheria; I have obtained a positive report from meatal swabs sufficiently often to make it of diagnostic value, to myself at least. The odour on cotton-wool mops can only be described as a penetrating stench.

**Local Appearances.**—I have found it very difficult to say anything definite regarding the usual changes in the Tympanic Membrane. In the cases where there is no desquamation, it is comparatively simple. Every variation is seen, from the mild catarrh to the red bulging membrane with all landmarks obliterated. In the majority of cases the meatus contains a varying amount of desquamated epithelium. The membrane desquamates, and no amount of syringing will remove it sufficiently to give even an approximate view of that structure. Frequently one sees a tiny pulsating spot in a greyish white mass at the bottom of the meatus. It will be remembered that these notes are written from only two years' experience of scarlet fever at close quarters, but I wish to state that during this time I have *not* seen the tympanic membrane destroyed in a few hours, or even in a few weeks. In every case where a large perforation was sooner or later noted, a history of previous ear discharge has always been obtained. A suggested cause for the destruction of the tympanic membrane over a large area will be put forward later (p. 501).

## *Situation of Perforation—*

	Anterior, etc.	Posterior.	Kidney-shaped.
1920-21 . . . .	89	10	2
1921-22 . . . .	49	2	3

## W. T. Gardiner

*Rhinitis*.—Mucopurulent rhinitis and early purulent rhinitis were noted forty-five times altogether in the two years. Its occurrence, however, was not always strictly noted, and therefore stress cannot be laid on this figure.

*Adenoids*.—If the child was not too ill, adenoids were sought for by palpation at this examination; if not, the possibility of their presence was noted as shown by mouth breathing and pinched nostrils, and they were sought for later. Adenoids were diagnosed 141 times. The otorrhœa in some of these cases dried up and the patients were discharged from hospital without operation. More will be said presently about this.

### Treatment.

**Paracentesis**.—In the early days an attempt was made to perform paracentesis in every case in which the tympanic membrane was observed to be bulging. This was found to be impracticable, firstly, because the writer never does paracentesis without a general anæsthetic (ethyl chloride); secondly, as a result of this attitude it was necessary to obtain parental consent. It entailed sending a special messenger to the parents asking their attendance at hospital in order to give written permission. In favourable cases the paracentesis was done within six hours of observing the bulging drumhead. In some cases, even this was not early enough, as frequently when the patient was placed on the operating table, it was found that the membrane had already ruptured. A study of these cases, along with similar cases which occurred on the days when the hospital visit was not made, raises the question whether early paracentesis is the *sine quâ non* it is represented to be? The drumhead ruptures so easily and readily in children, and the period of pain is so short, that one cannot be dogmatic regarding early paracentesis. If adenoids were present they were removed at the same time as the paracentesis. The anæsthetic used was ethyl chloride.

**Conservative Treatment**.—This was carried out by the wet method in the usual way—instillation of  $\text{H}_2\text{O}_2$  and regular syringing, the frequency varying with the amount of discharge.

**Further Operative Treatment**.—The writer must confess that he took up this work with the preconceived belief that the removal of adenoids, if present, was the surest method of curing the otorrhœa and preventing subsequent chronicity. He has acted upon this in his practice. Adenoids, and, as a

## Scarlet Fever Otitis

rule, the tonsils also, have been removed in otorrhœa cases at the earliest date on which the physician in charge considered the child fit for operation. The results have shown that the average duration of the discharge after the removal of tonsils and adenoids is fourteen days. Thereafter, the ear has remained dry and the perforation has healed. The procedure up to this time has never failed in primary otorrhœas. A few cases with a history of previous discharge have failed to respond, but the majority of these have become dry. A high percentage of primary cases are dry in seven days. The rule at the Edinburgh City Hospital has been that no case of scarlet fever with otorrhœa was allowed to leave hospital with the ear discharging. The average stay in hospital of such cases, in the pre-operation period, was sixty-eight days in 1919. In 1920, the average duration was reduced to sixty-two days, and in 1921, it was still further reduced to fifty-two days.

Otorrhœa associated with adenoids dries up occasionally under conservative treatment, but the result is only temporary. Sooner or later the ear commences quietly and painlessly to discharge again, and so the vicious circle continues. This factor, in the writer's opinion, is the most important cause of the eventual destruction of a large area of the tympanic membrane in scarlet fever cases. Painless onset of otorrhœa at any stage of the fever is diagnostic of adenoids.

So strongly does one feel that the nasopharynx is the primary seat of otorrhœa in scarlet fever, that one would lay it down as an axiom that every case of scarlet fever in which adenoids are present, whether disclosing otorrhœa in hospital or not, should have the adenoids removed before leaving hospital, for otorrhœa is liable to develop with the first rhinitis the child acquires after leaving hospital. This has been proved over and over again. The writer is otologist to four ear clinics in Edinburgh and Leith. Parents are instructed to report to the most convenient clinic should ear symptoms arise, so that he is able to keep the children under further observation. At these centres cases have been seen which did not disclose otorrhœa while in Colinton Hospital, and yet they developed it within a month of discharge from hospital. One or two of them have been responsible for "Return Cases." Such is human nature, that parents who refused permission for operation at the City Hospital bring their children to the voluntary hospital for advice and treatment—presumably to consult a proper ear

## W. T. Gardiner

specialist at the voluntary hospital rather than at the "rate-paid" one.

It has been suggested that a fever hospital, with its virulent infections, was the least desirable place to leave a raw surface in the nasopharynx or oropharynx. Careful note was kept of the temperature, etc., after all tonsil and adenoid operations. On one or two occasions on the evening of operation the temperature rose to 100, but was normal next morning. In no case has there been any untoward occurrence. Cases heal rapidly and well.

Every patient was given a prophylactic dose of 500 units of diphtheria antitoxin before operation. They have been kept in the general ward and no effort has been made to segregate them in a side or special ward.

The instruments used were Sluder's enucleating guillotine and the Gottstein adenoid curette. General anæsthesia with ethyl chloride was administered.

I am inclined to think that operation should be carried out earlier than has been done, and I hope to do so in future. There is a difficulty in a rate-paid hospital that does not exist to the same extent in the voluntary hospital. Patients go voluntarily to the Royal Infirmary, but they are forced into Colinton by Act of Parliament. It is therefore necessary to hasten slowly and prove every point as one goes along. This will be more readily appreciated by the staffs of rate-paid hospitals.

### **Mastoid Complications.**

Out of a total of 300 scarlet fever otorrhœas examined, 21 (7 per cent.) developed a mastoid complication. Of these, 10 had an extension of the disease, involving exposure of the lateral sinus; that is to say, when the mastoid cortex was removed, the lateral sinus was found exposed to a greater or less extent, and its wall more or less altered in appearance. On two occasions true perisinus abscess was encountered, where on the removal of apparently healthy bone a collection of pus under pressure escaped from around the sinus. Only one case of meningitis was observed and infection by way of the middle ear cleft in this case was doubtful.

Generally speaking, two types of mastoid complication were met with in practically equal numbers: (*a*) developing in the third week of the otorrhœa with pain, tenderness, œdema and



## Scarlet Fever Otitis

usually a rise of temperature, on the average  $101^{\circ}$ —here a small quantity of pus was found in the antrum and the whole mastoid process intensely inflamed; (*b*) developing later in the otorrhœa, fourth or fifth week, usually quietly, without pain or tenderness, until the subperiosteal abscess appeared. Even then, temperature, as a rule, was absent. In these cases the mastoid process was an abscess cavity containing pus and small sequestra, only to be compared with cracked ice melting in a cup. When this was removed the sinus wall not uncommonly was found bathed in it. From three of the cases operated on, I have come to the conclusion that it is well to remove bone wide of apparent disease. Failure to do this in early cases delayed healing, and in one case necessitated a second operation for removal of sequestra. In no case was it necessary to perform the radical or modified radical operation.

*Temperature.*—Increase of temperature when present gives a reliable indication, but its absence does not necessarily imply absence of extensive disease.

*Technique.*—The simple mastoid operation was carried out in the ordinary way. When all macroscopically diseased bone had been removed, the cavity was thoroughly swabbed with methylated spirit. B.I.P.P. was rubbed into the bony surface and all excess removed. Iodoform worsted was lightly placed in position and the skin wound sutured with the exception of the lower angle. A few sterile swabs were placed over the wound and kept in position by a rubber bathing cap while the adenoid operation was performed. The first dressing with removal of stitches was undertaken on the fifth or sixth day, and, thereafter, daily dressing was the rule.

*Removal of Adenoids.*—Adenoids, when present, were removed in every case at the end of the mastoid operation. The method employed is as follows:—When the actual bone operation is finished and the wound is undergoing treatment with spirit and B.I.P.P., the anæsthetist is requested to stop the anæsthetic. By the time the wound is treated and the necessary stitches inserted, the patient is sufficiently “out” to have the adenoids curetted without fear of the cough reflex being absent. The temporary dressing being in position the patient is moved to the end of the table, and with the head hanging, the adenoids are curetted. The tonsils are not touched at this operation even should they require removal. Up to the present time there have been no untoward occurrences resulting from this

## W. T. Gardiner

method. On an average healing has taken place in three weeks with restoration of the hearing.

*Bacteriology.*—In practically every case the pus from the mastoid abscess has produced streptococcus on pure culture. In one case the pneumococcus was isolated, and one case was reported sterile.

*Case Report.*—The intracranial complication (meningitis) is reported in full:—

J. F., male, aged 9. Otitis media (left) arose on the eleventh day of disease.

29 1 21.—Pain in the left ear complained of; *L.T.M.* pinkish but not bulging; patient hears a whisper at 4". There is considerable post-nasal obstruction; enlarged submerged unhealthy tonsils; probable adenoids but no discharge from the ear.

2 2 21.—Discharge from the left ear commenced yesterday, very profuse; slight tenderness over the mastoid; thick mucoid pus. Perforation not seen.

23 2 1.—*L.T.M.* there is pulsating pus in the meatus; discharge is copious. There is no bulging of the membrane. The perforation is central—about the region of the umbo. The fauces are red.

26 2 21.—Pulse rate is fast. Temperature rose to 102, dropped to 99.6, rose to 102, and remained up for eight hours. Temperature commenced to rise a week ago and it has been gradually rising since. Left meatus contains thick mucoid pus. There is a little fullness of the posterior quadrant. The tongue is very dirty.

28 2 21.—Temperature rose to 104 yesterday. To-day it is 102. Left meatus is full of pus.

2 3 21.—There is still a good deal of discharge in the meatus. The temperature is swinging between 103 and 102—never below 101.

3 3 21.—The temperature suggested a meningitic condition; definite neck rigidity was found. Kernig's sign was present on both sides. Blood count as follows:—Total reds, 6,100,000; total whites, 24,000: polymorphs, 62.3 per cent.; lymphocytes, 35.3 per cent.; mononuclears, 1.3 per cent.; eosinophyls, 1 per cent. There has been no complaint of headache at any time; no vomiting; no irritability. The patient has at all times been perfectly lucid. Lumbar puncture was performed and the cerebro-spinal fluid was discovered to be under tension and cloudy. Fehling-reducing substance was absent. Organisms were found in the fluid, but they were all intra-cellular. It was decided to operate as soon as consent could be obtained. The usual incision was made. A thick cortex was quite unaltered, but on removing it the bone was found to be soft. There was a certain amount of muco-purulent secretion in the antrum and in some cells,

## Scarlet Fever Otitis

including the tip cell. The surface of the tip of the mastoid was soft. There was no macroscopic connection between the mastoid process or antrum and the posterior fossa. The sigmoid sinus and cerebellar dura mater were exposed by operation. The sinus was healthy. The cerebellar dura was tense; it was incised. Cerebro-spinal fluid and some blood flowed at once. Before incising the dura mater the cavity was thoroughly cleansed with hot boric solution which produced the normal labyrinthine reaction. Thereafter the cavity was soaked with spirit and thoroughly bipped. The wound was lightly packed and left open. Instructions were given regarding lumbar puncture and anti-streptococcic serum.

*Cerebro-spinal Fluid.*—Direct film. A slight yellow deposit contained pus cells and gram-positive streptococci, mostly intracellular. Culture: a good growth of streptococci but the arrangement in chains not so typical as in direct film.

Patient died at 6 P.M.

In conclusion, I wish to acknowledge my indebtedness to Dr C. B. Ker, Superintendent, Edinburgh City Hospital, for much friendly help and encouragement, and to Drs A. Logan Turner and J. S. Fraser for suggestions and help as to the lines on which the present investigation should be carried out.

# MIXED TUMOURS OF THE MOUTH AND RESPIRATORY TRACT, WITH REPORT OF A CASE ARISING FROM THE ANTERIOR NARES.

By F. HOLT DIGGLE, F.R.C.S. (Eng.), Manchester.

## INTRODUCTION.

MIXED tumours, *i.e.*, tumours presenting elements of ectodermal and mesodermal origin frequently arise in the salivary glands, but their origin in mucous membranes is a rarity.

New<sup>1</sup> in an analysis of 68 cases of mixed tumours occurring in the Mayo Clinic between the years 1912-18 gives the following sites of origin—Larynx 1, pharynx 4, palate 3, upper lip 3, sublingual region 1, cheek 1, submaxillary region 5, parotid 50; and Wood,<sup>2</sup> in 59 cases examined, records their occurrence as follows—Parotid 26, submaxillary 13, palate and pharynx 14, lip 4, neck 2, cheek 1. Verholf<sup>3</sup> reports 5 cases occurring in the lachrymal gland, whilst Da Costa<sup>4</sup> quoted the following cases—Tonsil 1, nasopharynx 2, superior maxilla 1, carotid body 2. Dembrowski<sup>5</sup> records a case in which the tumour arose from the nares.

It will thus be seen that the salivary glands (parotid and submaxillary) are responsible for about 70 per cent. of the cases met with in the human subject.

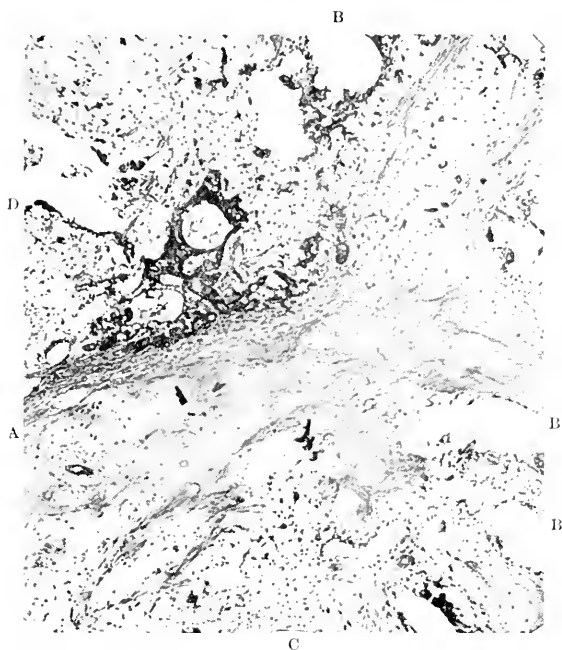
CASE REPORT.—E. E., male, aged 62, was first seen in consultation on 25th November 1920, complaining of a swelling in the left nostril.

*History.*—He was perfectly well until eight years ago, when he fell and caught the tip of his nose on a bar of iron. His nose bled immediately after, but he suffered no further inconvenience until twelve months later, when he noticed that he could not breathe down the left side of his nose. Four years ago he noticed increasing nasal obstruction on the left side, and latterly some swelling of the face. He has had no epistaxis since the accident.

*Examination.*—The left nostril is completely occluded by a mass attached to the outer wall, of firm consistence, with an intact mucosa, and presenting an appearance not unlike an unripe strawberry. The swelling extends into and obliterates the left naso-labial fold. There is no pain, no enlargement of the lymphatic glands in the neck, and no involvement of the posterior nares. Transillumination shows that the left antrum is not involved.

# Tumours of Mouth and Respiratory Tract

*Operation.*—20th December 1920. Thinking it was possibly a fibrosarcoma, I decided to remove a portion for microscopy. After dividing its outer attachment with turbinectomy scissors, it was discovered that the mass was free and could easily be shelled out of its capsule and expressed from the nose by pressure on the outside. There was very little bleeding, and after enucleation it was seen that the raw area, from which the tumour had arisen, was a small patch about half an inch in diameter just in front of the anterior attachment



SECTION OF TUMOUR SEEN UNDER LOW POWER.

- A. Islets of cartilage merging into the general connective tissue stroma.
- B. Cystic spaces containing mucin.
- C. Myxomatous connective tissue.
- D. Mass of spheroidal cells surrounding a cystic space.

of the left inferior turbinal. The rest of the nasal passage was normal; the remains of the capsule were easily pulled away.

On sectioning the tumour a quantity of brownish mucoid fluid escaped, and it cut with a firm, fibrous sensation. The cut surface presented a greyish colour interspersed with loculi containing a brownish mucoid fluid, and here and there small islands of a whiter colour and firmer consistence.

I am indebted to Dr Dible, Senior Lecturer, Pathological

## F. Holt Diggle

Department, Manchester University, for the following histological description:—

“The tumour consists mainly of branching masses of large epithelial cells in a loose myxomatous matrix, having the general aspect of a so-called cylindroma. Closer observation reveals irregular islets of cartilaginous transformation in the matrix, and at one place a well-formed epithelial pearl is to be seen. The tumour corresponds closely to the common mixed tumour of the parotid region.

“The epithelial elements are for the most part spheroidal, with an abundant cytoplasm and a pale oval or round lightly-staining nucleus. They seem to pass by insensible degrees into the branching connective tissue cells, which are distributed through the myxomatous portions of the section and which appear responsible for the production of this area of the tissue. It is noteworthy that certain authors, *e.g.*, C. Kaufmann, regard these growths as being essentially of connective-tissue origin, a position which appears untenable in the case of some parotid tumours in which squamous epithelium predominates. Krompecher, on the other hand, believes that many of them are basal-celled carcinomata in which the cartilaginous portions are formed by metaplasia of the epithelium. In the present tumour there seems to be a definite transition from the epithelium-like cells to those of the connective tissue. It is hard to say why metaplasia should be invoked on the part of one tissue at the expense of another: granted that the two tissues are present together as new formations, it seems more reasonable to derive them both from multipotential cells by a process of development.

“The tumour is definitely encapsulated, and in such cases, where removal is total, recurrence is not a usual sequel.”

*After History.*—The patient was last seen on 2nd February 1922, and there was no sign of recurrence local or remote.

### GENERAL CHARACTERISTICS OF MIXED TUMOURS.

These tumours are of slow growth, very frequently encapsuled, and unless modified by sarcomatous or carcinomatous changes, never cause glandular involvement or internal metastases. It is generally believed that the female sex predominates; but Martin,<sup>6</sup> after a careful scrutiny of published cases, arrived at the conclusion that there is no predilection for either sex. Sturgis<sup>7</sup> states that the usual opinion that mixed tumours occur more frequently in young people is non-proven; for in a series of collected cases 50 per cent. occurred after 40 years of age, and 35 per cent. after 50 years; and of the cases occurring after 40 years of age, four were stated to have begun at 43, 51,

# Tumours of Mouth and Respiratory Tract

52, and 59 years of age respectively. Wood, however, records a case as early as 7 months, and Wagener, a sublingual tumour in an infant of 12 weeks.

The patients generally seek advice because of increase in size of a tumour which has been in existence for several years. In New's cases, already quoted, 33 had been in existence for more than five years, and 22 for more than ten years, 5 cases for more than thirty years.

**Etiology.**—The etiology of these tumours has given rise to much controversy and research. The difficulty has been to account for the multiplicity of tissues incorporated in the tumour, and from an attempt to derive them from a common source whether this be epiblast or mesoblast.

Histologically, the tumour is of very complex structure, presenting epithelial elements, arranged either in columns (cylindroma), alveoli or diffused masses, bound together by mesoblastic elements of hyaline, cartilaginous, mucoid or connective tissue structure. Two or more of the mesoblastic elements may be found in the same tumour.

Originally these tumours were regarded as carcinomata, and the cartilaginous element was looked upon by Virchow as derived from the connective tissue by metaplasia, whilst Cohnheim accounted for it as an inclusion from the branchial arches.

Later, Kaufmann<sup>8</sup> considered the cells as derived from connective tissue cells and classified the tumours as sarcomata.

Wartmann,<sup>9</sup> in 1879, later supported by Volkmann,<sup>10</sup> labelled them endotheliomata, and maintained that the cells were formed from the endothelium of the lymphatics and blood-vessels. The French School (Collet<sup>11</sup> and Pittance<sup>12</sup>), however, opposed the endothelial, and strongly supported the epithelial origin of the cells. In 1899 the French School were supported by Hinsberg<sup>13</sup> and Ribbert, the former, by a series of embryological studies, showing that the cells might originate from masses of salivary gland epithelium isolated during evolution.

Krompecher<sup>14</sup> regarded them as basal-celled carcinomata, and found that the epithelial cells, by a process of fibrillation, form the connective tissue stroma resembling mucoid or embryonic connective tissue, and that by further metaplasia cartilage is formed.

Ehrich, again, referring to salivary-gland tumours, has shown that they are derived from the proliferation of duct epithelium, *i.e.*, they are adeno-carcinomata.

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Whilst accepting the epithelial origin of these tumours the difficulty has been to explain the presence of cartilage; but Fraser,<sup>15</sup> by a series of experiments, including ligation of the ducts and the injection of irritants into the ducts, was able to artificially produce tumours resembling, histologically, the common parotid tumour. Further, by suitable staining, he demonstrated the formation of cartilage from the epithelium.

It is thus seen that the origin of these tumours is still *sub judice*, but their present status may be quoted from Ewing.<sup>16</sup>

- “(1) The endothelial origin has been disproved.
- “(2) No single source of the mixed tumours meets all the requirements. Some are distinctly adenomatous, and probably arise from the acini and ducts of the gland in which they are well incorporated, while others are encapsuled or extra-glandular, these probably arising from misplaced and occasionally embryonal portions of the gland tissue; branchial remnants may possibly be connected with this group.
- “(3) The derivation of mucous tissue and cartilage from epithelium has been proved.”

**Clinical Types:—Pharynx.**—Mixed tumours present a uniform swelling with intact mucous membrane, situated in the lateral wall or to one side of the middle line. If small, they are frequently mobile under the mucous membrane. As they increase in size the surface mucous membrane ulcerates from pressure atrophy. Owing to the slow growth of the tumour the patients at first complain of little discomfort, but later dysphagia and dyspnoea supervene.

**Larynx.**—New records the only case occurring in the larynx. It presented as a subglottic infiltration without ulceration. The patient had suffered from increasing dyspnoea for eight years.

**Lips.**—The upper lip is most frequently affected. Wood records the only case of a mixed tumour arising in the lower lip. The tumour starts to one side of the middle line, is firm and elastic in consistence with occasional fluctuating areas; frequently mobile it causes little or no discomfort.

**Palate.**—Mixed tumours occur more frequently in the hard than the soft palate. Sturgis collected fourteen cases of soft palate tumours. The bulk of the tumour causes interference with phonation, deglutition, and respiration. Their usual site is



# Tumours of Mouth and Respiratory Tract

on either side of the middle line—the only median tumour collected by Sturgis was reported by Van Gabourd,<sup>17</sup> and grew from the superior surface of the palate near the nasal fossa. Gabourd described it as a fibrolipoma. In the fourteen cases of soft-palate tumour there is no mention of recurrence, glandular involvement or metastases, but their site demands early removal.

**Prognosis.**—This depends upon the age and rate of growth of the tumour, its encapsulation, and its complete removal at operation. Although, as already stated, these tumours are characterised by slow growth, extending over years, yet in a few cases sudden and rapid increase in size results from sarcomatous or carcinomatous changes with glandular involvement and internal metastases.

Encapsulated tumours, owing to their better chance of complete removal at operation, offer the best prognosis. Incomplete removal leads to extensive local recurrence, and repeated unsuccessful operative attempts at total ablation are very liable to set up sarcomatous or carcinomatous changes. Wood, in his series, found that 45 per cent. of the parotid cases recurred locally, and of these, 20 per cent. showed evidence of internal metastases.

**Treatment.**—This rarely presents any difficulties, except on account of the size of the tumour and its inaccessibility. The tumour usually shells out quite readily when once the capsule has been incised. Some large pharyngeal tumours may necessitate approach from the side of the neck by a lateral pharyngotomy.

**BIBLIOGRAPHY :—**<sup>1</sup> G. B. New, *Mayo Clinic Reports*, 1912-1918. <sup>2</sup> Wood, *Annals of Surgery*, 1904. <sup>3</sup> Verholf, *S. Med. Res.*, 13. <sup>4</sup> J. C. Da Costa, *Modern Surgery*, Ed. 8, Philadelphia, 1919. <sup>5</sup> Dembrowski, *Deutsche Zeitschrift. für Chirurgie*, 32, 1891. <sup>6</sup> Martin, *International Clinic*, 4, 1918. <sup>7</sup> Sturgis, *Surg. Gynæ. Obst.*, 18, 456-459, 1914. <sup>8</sup> Kaufmann, *Langenbeck's Archiv. f. Chirurgie*, 26. <sup>9</sup> Wartmann, *Diss.*, Strasburg, 1879. <sup>10</sup> Volkmann, *Deutsche Zeitschrift. f. Chirurgie*, p. 41. <sup>11</sup> Collet, *Centralblatt f. Allg., Pathologie*, 1896, and *Thesis*, Paris, 1894. <sup>12</sup> Pittance, *Thesis*, Paris, 1900. <sup>13</sup> Hinsberg, *Deutsche Zeitschrift. f. Chirurgie*, 51. <sup>14</sup> Krompecher, *Zeigler's Beiträge, z. Path. Anat.*, 28, 37, 44. <sup>15</sup> Fraser, *Surg. Gynæ. Obst.*, p. 19, No. 27, 1918. <sup>16</sup> Ewing, *Neoplastic Diseases*. <sup>17</sup> Gabourd, *Gaz. des Hôpitaux*, lxi., 650, Paris, 1888.

## THE DEVELOPMENT OF TRANSATLANTIC RHINO-LARYNGOLOGY.

*Abstract of the Semon Lecture of the University of London.\**

By HERBERT S. BIRKETT, C.B., M.D., Montreal.

THE address opened with an appreciation of the honour conferred not only on the lecturer himself, but also on the medical profession of Canada, by the invitation to deliver the lecture, and with a eulogy of the personal qualities of Sir Felix Semon, the founder of the lectureship, whom it was his privilege to count as a warm friend, and who held decided opinions and did not hesitate to frankly express them.

Five years after Garcia introduced the laryngoscope, Hugo Stangenwald described it before the New York Medico-Chirurgical College, and in the following year Krackowizer stated to the New York Academy of Medicine that he had seen the living vocal cords by means of an instrument he had received from Vienna in 1858. Abraham Jacobi claimed that, in 1856, he had a mirror made with which he examined the larynx of one of his patients. In 1892, Wagner of New York, published an article on laryngoscopy and rhinoscopy. There was much scepticism concerning the laryngoscope, but Horace Green did not share this, for he said, "If that instrument can be brought into general use, I am confident that the profession will be able to cure diseases which are now too frequently overlooked." Horace Green had visited the European clinics, and returned full of enthusiasm for its possibilities, being the first to devote himself entirely to diseases of the respiratory tract, upon which he wrote a number of contributions. His name is inseparably and most honourably connected with the history of Topical Medication of the Larynx. Another great worker in the same field, contemporary with Green, was Louis Elsberg, who has been described as the most accomplished laryngologist in America. It was he who brought into use such appliances as the sponge-carrier, porte-caustic fumigation tube, and electropole. He also, with F. H. Davis, founded the American Laryngological Association, and was its first President. In 1828, Physick invented the tonsillotome, which at first was used as an uvulotome.

\* The address was published *in extenso* in *The Lancet*, 22nd July 1922.

# Transatlantic Rhino-Laryngology

The earliest record of a contribution on diseases of the throat in America was that made about 1683 by John Josselyn. In 1771, Samuel Bard published a very concise treatise on diphtheria, and, in 1774, Jacob Ogden described the disease under the title, *The Throat Distemper*. The earliest classical text-book of special interest to Laryngology was one by Samuel Gross in 1854, on *Foreign Bodies in the Air Passages*, and he was the first to show why foreign bodies most frequently entered the right bronchus. A remarkable and monumental piece of work was Elsberg's *Bibliography of Laryngology*, extending from 1809 to 1878; and in 1864 he published a monograph on *Laryngeal Medication*, this being the first transatlantic work on laryngoscopy. In 1865, he contributed a work on the *Surgical Treatment of Morbid Growths within the Larynx*, winning with it a prize presented by the American Medical Association. In this work he deals with the histogenesis of laryngeal tumours. He also contributed a large number of other valuable scientific papers.

J. Solis-Cohen is another name which shines in the steady advance of the specialty, and his was a stimulating influence for forty years. We have to credit him with an epoch-making advance in having performed total extirpation of the larynx for adeno-carcinoma by the original method of attaching the free end of the trachea to the skin, and the first complete treatise on diseases of the throat published in any country came in 1872, from his pen. Delavan has given this work the most unstinted praise.

Dr Birkett proceeded to recount a number of other American workers in the same field up to the year 1900, such as Clinton Wagner, well known as one of the early pioneers of thyro-fissure for malignant disease of the larynx; Fletcher Ingals renowned as a bronchoscopist and œsophagoscopist, and the introducer of distal endoscopic illumination; Bosworth, who published two large volumes on Diseases of the Throat and Nose in 1889; and Shurley who published his work in 1900.

It is recorded that, in 1845, Horace Green, whom we have already mentioned, removed a pedunculated tumour from the larynx by pressing the tongue down and thus bringing the epiglottis into view, and when the patient coughed the polyp was caught by a slender hook and removed by a probe-pointed knife. In 1886, laryngo-fissure, without tracheotomy, was first performed in America by Ephraim Cutter of Boston, though Gurdon Buck

## Herbert S. Birkett

of New York performed laryngo-fissure with tracheotomy in 1851, and the latter could be regarded, the lecturer considered, as a pioneer in intra-laryngeal surgery.

The first satisfactory photographs of the larynx can be attributed to Thomas R. French in 1882. The most epoch-making advance in Laryngology was made in 1885, when O'Dwyer introduced his intubation tube for the treatment of acute and chronic forms of stenosis of the larynx. Coolidge junr. and Fletcher Ingals did much to advance bronchoscopy in America, and published many contributions. They were the first in that country to remove foreign bodies by this method, and to Chevalier Jackson is due the credit for the transatlantic development and perfection of this art, his most comprehensive work appearing in 1914.

*Special Societies.*—Dr Birkett said America was the first home of special laryngological societies, the first, the New York Laryngological Society, having been founded by Wagner in 1873; soon, however, it became a section of the New York Academy of Medicine. Five years later the American Laryngological Association came into being, and, in 1861, Elsberg commenced to lecture in the New York City University on Laryngology, and two years later the first laryngological clinic was established.

*Special Journals.*—The first journal devoted to the specialty was the *Archives of Laryngology*, founded in 1880, followed by the *Annals of Otology, Rhinology, and Laryngology* in 1892, after which came the *Laryngoscope*.

*Rhinology.*—Dr Birkett said that rhinology was considerably slower in its development than laryngology. The disastrous effects of mouth-breathing were first pointed out by a layman named George Catlin, who published, in 1861, the results of his observations during a long residence among Indians in the North and South American Continents. The early literature of rhinology consisted almost solely of records of cases; there was a sparsity of new theories. But in 1874, the study received a great impetus from the work of Morris Asch, John Nolan Mackenzie, Bosworth, Clinton Wagner, and others, chiefly in the direction of removing obstructions to respiration; and the next step was in correcting abnormalities of the septum. J. Solis-Cohen was the first to remove, in 1878, bony obstructions by means of the dental engine. In 1882, Fletcher Ingals performed resection of the nasal septum, which he carried out

## Transatlantic Rhino-Laryngology

by incising the mucous membrane, reflecting it from the underlying cartilage, then removing the deviated portion, replacing the flap, and retaining it in position by sutures. In correcting nasal deformities the name of John O. Roe stands out prominently. W. H. Daly called attention to the clinical connection between hay fever and nasal diseases in 1882; and it was he who, in the same year, called the attention of the profession to affections involving especially the antrum. Operations for the cure of chronic suppurative conditions of the antrum were carried out by G. W. Caldwell in New York simultaneously with those by Luc in Paris. Koller, in 1884, first suggested the application of cocaine as an anæsthetic in this field of work, and Bosworth, in the same year, drew attention to the contractile power of the drug on the mucous membrane of the nasal cavity. Bates, an oculist of New York, drew attention to the value of suprarenal extract as a hæmostatic. Emil Mayer was the first to publish an essay on the clinical use of adrenaline in rhinology.

*Education.*—Dr Birkett went on to say that for many years the teaching of rhinology and laryngology had been included in the medical curricula of most of the leading universities, usually in the final year, and that the minimum number of marks for a pass was 50 per cent.

Post-graduate teaching in these subjects started in New York in 1877, and this greatly helped the spread of knowledge on these specialties in the profession. There were now post-graduate institutions with excellent facilities in this line of work, and he quoted the recommendations agreed upon in regard to the education of the specialist. In many schools otology was united in the same chair as laryngology and rhinology. He concluded with a word of warm appreciation of the part played by America during the last seventy years in raising these important departments of practice to their present position.

## CLINICAL RECORDS

### PARALYSIS OF THE RIGHT VOCAL CORD FOLLOWING LEFT MAMMARY CARCINOMA.

By J. M. DARLING, D.S.O., F.R.C.S.Ed., Surgeon to the  
Edinburgh Eye, Ear, and Throat Infirmary.

THE patient, a single woman, aged 58, was seen on 8th May 1922, complaining of hoarseness which had lasted for several months, and which was attributed by her to a persistent cough of some weeks' duration in the autumn of 1921, and to an attack of influenza in January 1922.

On examination, the right vocal cord was found to be immobile and in the cadaveric position. The larynx was otherwise normal. A fullness was observed in the right side of the neck, and on palpation there was found a mass of hard glands in the right supraclavicular fossa. There were no palpable glands on the left side. On proceeding to examine the chest, it was found that the left breast had been removed. There were no definite glands palpable in either axilla, and no signs of intrathoracic disease.

The following history was then elicited. I am indebted for the details to Sir Harold Stiles under whose care she had been.

On 2nd July 1917, the patient consulted him about a painless lump in the left breast which she had noticed more than six months previously. There was found a firm, rather hard, mass in the upper hemisphere of the left breast about the size of a horse-chestnut. There was no tacking down of the skin over the tumour, nor could any enlarged glands be felt. The breast as a whole, however, was a little more elevated than on the opposite side. On 11th July 1917, the left breast was removed, together with the sternal fibres of the pectoralis major and the pectoralis minor. The axilla was cleared out. On slicing the breast the tumour was found to be malignant, and the axilla contained several small shot-like and somewhat indurated glands. The microscopic preparation revealed a carcinoma of a somewhat encephaloid type with invasion of the surrounding fat. The glands from the axilla showed marked endothelial proliferation in the sinuses, but no malignant disease could be discovered.

On 30th May 1919, there was a further operation for a recurrent nodule adherent to one of the ribs.

On 19th March 1920, three more recurrent nodules were discovered, adherent to the chest wall, and, on 15th April, three tubes of radium

## Paralysis of the Right Vocal Cord

were introduced, one into the largest nodule and the other two into the neighbourhood of the two small ones.

On 18th November 1920, three small nodules, each the size of a split pea, in the lower part of the scar were excised along with an elliptical area of skin, and two tubes of radium were introduced. A small nodule, the size of a swan-shot, was removed from the axilla along with a similar shaped area of skin. On cutting into this it was found to be malignant and a radium tube was introduced.

In October 1921, there was a further local recurrence which was treated by radium.

Dr Hope Fowler kindly made a radiographic examination of the chest on 5th June 1922. The photograph showed a few small calcareous mediastinal glands and some diffuse peribronchial fibrosis—probably an old-healed tuberculous condition. There was no evidence of secondary carcinomatous lung deposit, but there was a slight blurring in the vicinity of the right apex, due, no doubt, to the enlarged glands at the root of the neck. The trachea was shown to be pushed a little to the left side.

In a paper on paralysis of the vocal cords secondary to malignant tumour of the mamma which appeared in this Journal in August of last year, Dr Logan Turner quoted two cases in which the paralysis was contralateral. In each of them the tumour was on the right side and the paralysis on the left. He pointed out that there is a pathway for contralateral infection through the cutaneous lymphatics which drain, in part, into the supraclavicular and axillary glands of the opposite side. This would appear to be in keeping with the sequence of events in the present case. At the time when the breast was removed there was no skin involvement. Subsequently there was recurrence involving skin, and thereafter—the more readily perhaps because of the removal and destruction of other channels—infection spread to the supraclavicular glands of the opposite side, with resulting pressure on the right recurrent laryngeal nerve and paralysis of the right vocal cord. It is a question for speculation whether the cough from which the patient dated her laryngeal trouble was an initial passing symptom of interference with the recurrent nerve, and if so by what mechanism the symptom arose.

# George A. Carter

## BILATERAL ABDUCTOR PARALYSIS OF THE VOCAL CORDS FOLLOWING CARCINOMA OF THE RIGHT BREAST.

By GEORGE A. CARTER, F.R.C.S.E., Hon. Surgeon in charge of Ear, Nose, and Throat Department, North Staffordshire Infirmary, Stoke-on-Trent.

DR LOGAN TURNER, in the *Journal of Laryngology and Otology* for August 1921, drew attention to the sequence—cancer of the breast, secondary glandular enlargement, vocal cord paralysis—and recorded six cases, in all of which the vocal cord paralysis was unilateral. The homolateral cord was affected in four of the cases and the contralateral in two, both of which were right-sided scirrhus carcinomas.

In the case here recorded, one of right-sided scirrhus carcinoma, both recurrent laryngeal nerves were implicated with resulting bilateral abductor paralysis. This is a rare condition.

Although the adductors appear to show commencing weakness, it is doubtful if the patient will survive long enough for complete bilateral recurrent paralysis to be observed, with its total loss of voice, but with safety from the grave risk always attending the earlier stage of abductor paralysis, viz., attacks of urgent dyspnoea, and, perchance, fatal asphyxia.

In this respect also, the case differs from the cases of Dr Logan Turner, in all of which the total recurrent type of paralysis was observed, the affected cord lying in the cadaveric position.

After perusal of Dr Logan Turner's article, it appears probable that the pathway of lymphatic spread, which has involved the homolateral recurrent nerve, has been by way of the lymphatic vessels draining the inner part of the right mamma, passing through the chest wall and entering the internal mammary lymph glands. The efferent ducts of this chain of glands lie in close proximity to the pleura, before they pass into the venous circulation at the root of the neck, and by periglandular infiltration in this region the recurrent nerve has become involved.

I have observed paralysis of the right vocal cord in an early case of apical phthisis produced in the same way.



## Paralysis of the Vocal Cords

The paralysis of the left vocal cord can be explained by the permeation of cancer cells to the supraclavicular glands of the opposite side, which are enlarged and tender, and thence to the small paratracheal lymph glands which accompany the left recurrent laryngeal nerve.

The following notes prior to the patient being seen by me are abstracted from the record of the case when under the care of Mr Reginald Alcock, C.B.E., F.R.C.S.E., Senior Surgeon to the Hospital, to whom I am indebted for permission to use them.

Mrs A., aged 51, was admitted into the North Staffordshire Infirmary, Stoke-on-Trent, on 11th June 1919, suffering from carcinoma of the right mamma.

*History.*—About Christmas 1918, the patient noticed a swelling over the upper and inner quadrant of the right breast, described in the patient's own words as "being almost between the breasts and on the right side of the breast-bone." Dull, aching pain, which radiated to the axilla and down the arm, was complained of.

*State on Admission.*—There is a hard tumour, size not mentioned, palpable in the upper and outer quadrant of the right mamma. The skin over the tumour is adherent, but the tumour is movable on the deeper structures. There are enlarged glands in the right axilla.

Operation was performed by Mr Alcock on 12th June 1919. The complete operation was carried out. The right mamma with the pectoral muscles and fascia, also the axillary contents, which contained many enlarged glands, were removed *en masse*. The large area of skin adherent to the tumour, and the healthy skin around it which had to be removed, rendered it impossible to close the superficial wound in its entirety.

*Pathological Report.*—Typical scirrhus carcinoma.

*Subsequent Course.*—Patient was discharged from hospital on 7th July 1919 with a large, healthy, granulating wound.

On 11th August 1919, therapeutic X-ray treatment was commenced, and continued until April 1920. The dosage and frequency of sittings were not mentioned. By 22nd March 1920, the wound was completely healed, and the patient was in excellent general health, having gained weight.

After an interval of a year she attended the Out-Patient Department of the Hospital on 9th May 1921, complaining of headache and a cough, and there is a note stating that the breath sounds at the right apex were diminished. Another interval of nearly a year elapsed before the patient was seen again, during which time she

## George A. Carter

had been in good health. On 13th February 1922, she attended the Hospital now complaining of swelling of the right hand and arm, which, however, quickly passed away. On 1st May 1922, she was referred to the Medical Out-Patient Department with a note: ?secondary deposit in chest. Examination then revealed deficient air entry to the right lower lobe with crepitations in front and behind, those in front being pleuritic in character. X-ray examination showed enlarged mediastinal glands especially on the right side.

On 29th June 1922, the patient complained of difficulty in swallowing fluids for the last two months, which often occasioned choking attacks, breathlessness, and noisy breathing on exertion. She was referred to the Ear, Nose, and Throat Clinic, and was there seen by the narrator.

The following additional points in the history of the case were then obtained.

Since the removal of the breast just over three years ago, the patient has had no real trouble until Christmas 1921, when she contracted a "bad cold and cough," and, soon after, she noticed that her voice had altered, being weaker and higher pitched, and that there was some difficulty in breathing after any exertion. By the end of March 1922, the breathlessness on exertion was much worse, accompanied by inspiratory stridor, with exacerbations of transitory acute dyspnoea after coughing, upon exertion, and often during sleep. The voice was definitely altered, being weak, high pitched, and with a marked tendency to "crack." Dysphagia with fluids was not complained of.

Examination of the larynx showed bilateral abductor paralysis, both vocal cords lying together near the middle line, separated only by a narrow chink. On quiet inspiration the cords remained motionless, but on deep inspiration they approximated more closely, with stridor.

The question of a palliative tracheotomy was discussed and refused.

A second examination was made on 28th July of this year when it was found that the general condition of the patient had undergone much deterioration. The stridulous breathing and dyspnoea on exertion persisted, a cough making its appearance and the patient losing weight.

During the last five weeks she had had increasing difficulty in standing upright and in walking owing to acute and constant pain in the region of the right sacroiliac articulation. This was suggestive of secondary growth.

Examination of the larynx now showed, in addition to complete abductor paralysis, commencing involvement of the thyro-arytenoidei muscles, the vocal cords appearing somewhat narrower, more rounded,

## Paralysis of the Vocal Cords

and on phonation slightly concave in outline. The cartilaginous glottis still closed well, so that there was now an elliptical space between the cords on phonation. The voice was weak, croaky, high pitched, and slightly hoarse from the commencing adductor weakness.

There was no local recurrence of the disease, the operation scar and chest wall skin were healthy and free from dilated vessels. There was no swelling of the upper extremity. There were no palpable glands to be felt in either axilla, or in the right supraclavicular fossa, but the *left supraclavicular fossa* was tender to firm palpation, and multiple small hard glands, about the size of a pea, could be felt.

Dr A. Wilson Gill, Assistant Physician to the Hospital, whose notes I append, has kindly examined the chest for me, the patient now being under his care as a private patient.

"There is some emphysema, as shown by fixation of the ribs and lifting up of the clavicles. The apices bulge on coughing. Generally, the breath sounds are of the harsh vesicular type, but at the right apex and at the right base they are better described as broncho-vesicular, the expiratory phase being distinctly bronchial in type.

"In front, there is no dullness or change in the percussion note, and no difference on one side as compared with the other. Behind, there is a definite loss of resonance at the right base, and here the breath sounds are tending to the bronchial type, and there are moist crepitations during both phases of respiration. The vocal resonance is increased at this base but nowhere else, and there is no whispering pectoriloquy.

"Behind, the breath sounds are associated with a few rhonchi and crepitations, but particularly at the right base, as described. In front, there is almost a total absence of adventitious sounds.

"The sputum is frothy and gelatinous, and is very occasionally streaked with blood. The cough is spasmodic, as in whooping cough, with a loud brassy note, and it lacks the normal initial explosive impulse.

"Pulse rate averages 72 per minute, and the respiration rate 28 per minute. The heart shows no enlargement, and the sounds are clear and distinct."

# SOCIETIES' PROCEEDINGS

## THE SCOTTISH SOCIETY OF OTOLOGY AND LARYNGOLOGY

FIFTEENTH MEETING HELD IN THE ROYAL  
INFIRMARY, EDINBURGH

June 10th, 1922.

*President*—DR J. GALBRAITH CONNAL.

### **Two Cases of Nasal Deformity following Lupus treated by Plastic Operation**—Dr DOUGLAS GUTHRIE.

1. In a girl, aged 17, disease had destroyed the bridge, the tip of the nose, and the columella. The parts had been restored by local flaps and the implantation of costal cartilage.

2. The intranasal lupus had been treated successfully by Dr Brown Kelly, but cicatricial contraction had caused depression of the bridge. A graft of costal cartilage had relieved this.

**A Method of Rhinoplasty**—Mr J. J. M. SHAW (introduced by Dr Martin).

CASE I.—(a) Costal cartilage was implanted in nasolabial folds, and vertically in glabellar region. Storage of costal cartilage in abdominal wall. (b) Formation of nasal lining by in-turned hinge flaps carrying cartilage implants. Covering skin brought down from forehead by pedicle. (c) Restitution to forehead of portion of pedicle.

CASE II.—(a) Reconstruction of original wound by complete excision of scar tissue. Suture of skin to mucous membrane round wound. Mould inserted to keep ala depressed to proper position. (b) On sound healing of muco-cutaneous junction (three weeks) lining flap of skin turned down and sutured. Covering brought down from forehead by tube pedicle and sutured in raw area.

**Scarlet Fever Otitis Media. Report on Two Years' Work at the Edinburgh City Hospital for Infectious Disease**—Dr W. T. GARDINER.—(Published *in extenso* in the *Journal of Laryngology*, October 1922, p. 497.)

The PRESIDENT congratulated Dr Gardiner on a splendid piece of work. The excellent results which he had obtained from the removal of adenoids early in the fever were evidence that previous methods should be revised. He congratulated the Society, that as a result of its representation to the Edinburgh Health Committee, an otologist had been appointed to the Fever Hospital, and he suggested that a copy of the Report should

# Society of Otology and Laryngology

be sent to the Glasgow Authorities. Dr Gardiner drew attention to the fact that he had not seen sloughing of the tympanic membrane. It was well to remember, however, that there were differences in the type of epidemics, the benign and the malignant. It would be interesting to know the type prevalent in these two years. He (the President) would be inclined to urge the necessity of early and free paracentesis. Wilde's incision had a very limited sphere of usefulness.

Dr C. B. KER (Medical Superintendent, Fever Hospital), considered that Dr Gardiner's appointment had been of the greatest value to the Edinburgh citizens. He (the speaker) was also interested in the question of paracentesis. He thought it was the general opinion among otologists that early paracentesis was going to revolutionise the treatment of ear disease in a hospital such as his was. But the opportunities of doing this were very limited. In young children, half had no pain or any symptom drawing attention to the ear until discharge was seen on the pillow. Further, as Dr Gardiner had pointed out, even if the membrane were bulging, the child could not have an anæsthetic without permission; even in cases where arrangements had been made, the ear had commenced to discharge before operation was possible. Dr T. B. Layton, in London, had had the same difficulty. The new and important step was the removal of tonsils and adenoids. Regarding this at first with suspicion, he had become a complete convert, and many operations had been performed without a single accident. The children were nursed after operation in the ordinary wards of the hospital, and in spite of their open wounds, exposed to virulent infection, no complications had arisen. He believed that Dr Gardiner had already reduced, by about sixteen days, the detention of patients with discharging ears, and this had saved the hospital and the ratepayers considerable expense, more indeed than the salary attached to Dr Gardiner's office. Finally, the speaker had no doubt that the removal of tonsils and adenoids had done much to stop the nasal discharges, and consequently to remove the risk of infection to those at home after the child had left hospital.

Dr LOGAN TURNER had always had the impression that in scarlet fever cases the discharging ear was probably associated with adenoids. But he was interested to find from Dr Gardiner's report that only 47 per cent. of the cases with otorrhœa had adenoids, while 53 per cent. had not. He was interested also in the cure of the ear discharge by means of the incomplete Schwartze operation, when operation was necessary. The older members would recall that about eighteen years ago, considerable discussion had followed upon a paper by Dr Knyvett Gordon, who had found it necessary to do the complete operation in these cases, on account of failure to cure the discharge by the Schwartze method. He (the speaker) wished to know if Dr Gardiner was quite satisfied that his cases were cured.

Dr LEITCH asked whether Dr Gardiner had ever enlarged the perforation when he found the membrane had ruptured, before proceeding to the Schwartze operation.

Dr W. T. GARDINER (in reply) said that the septic cases were, from the surgical point of view, of the nature of ordinary septicæmia. After

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a period of swinging temperature the otitis developed and a mastoid operation became necessary. The temperature then usually settled. At operation an osteomyelitis of the bone was found. After removal of adenoids the discharge ceased, and the perforation, usually an anterior one, healed. The difficulty regarding paracentesis might be overcome by making the second on the resident staff a trained otologist, who would daily examine the cases, while the parents should sign a permission slip, as was done in an ordinary surgical hospital. He was unable to say beforehand in which cases Wilde's incision would suffice. In two or three he might have tried it, but as he had to prove his case he was anxious to avoid second operations. In cases without adenoids he believed the discharge cleared up without mastoid infection, though not always; the rule, however, being that the mastoid cases had adenoids. The Schwartze operation, he thought, was sufficient. He had never enlarged the perforation before doing the mastoid operation, but he had incised the membrane at the end of the operation when he thought it necessary.

**Lingual Accessory Thyroid**—Dr A. LOGAN TURNER.—Woman, aged 35, admitted with "blood-spitting." No organic disease was detected in chest or abdomen. A smooth, pink, firm sessile mass occupied the base of the tongue. Typical thyroid gland tissue was found in a portion removed for the microscope.

Dr GAVIN YOUNG had failed on palpation to detect the thyroid in the neck. He did not know what steps Dr Turner proposed to take, but in the event of removal of the accessory thyroid, it seemed to him that hypothyroidism should be watched for.

Dr LOGAN TURNER quoted a recent French paper, recording seventy-one cases of lingual thyroid, all, with four exceptions, being in women. As the tumour was giving the patient no trouble he did not propose to interfere.

**Small-celled Sarcoma of Naso-pharynx treated by Radium in February 1920**—Dr A. LOGAN TURNER.—Female, aged 30. The tumour had occupied the right side of the naso-pharyngeal vault, and radium was inserted for five consecutive days. There was no recurrence.

**Sarcoma of Nasal Cavity and Naso-pharynx**—Mr J. D. LITHGOW.—Boy, aged 9. In December a fungating mass occupied the left nasal cavity and naso-pharynx. This was removed and the left antrum explored, but found empty. Recurrence of tumour in January 1922. Radium treatment; total dose 3080 milligramme hours; disappearance of tumour.

Dr W. S. SYME thought that there was pus coming from the right sphenoidal sinus in the first case. If that were so, possibly the sarcoma had invaded that cavity.

Dr BROWN KELLY said he had had a case very similar to the first, and about the same age, treated two years ago. He had seen her recently and there was no recurrence.

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Dr EWART MARTIN thought Dr Turner's case had had 1700 radium milligramme hours and Mr Lithgow's about 3080. In the latter case there was complete destruction of the soft palate, which seemed to slough off about five days after the removal of the radium, and he thought that the peculiar character of the voice in Dr Turner's case might be due to slight radium paralysis of the soft palate.

**Acute Suppuration in the Left Frontal Sinus: Abscess of Left Frontal Lobe: Operation: Recovery**—Dr J. S. FRASER.—Male, aged 29, had influenza on 10th February with development of slight ptosis of left eyelid. Temperature did not rise above 100.5 F.: pulse 75. From 18th to 21st, headache and severe throbbing pain behind left eye. On 22nd February, he had a Jacksonian fit affecting right face, arm, and leg, lasting one and a half hours, preceded by and succeeded by a short period of loss of speech: he was never unconscious. On 27th examined by Dr Edwin Bramwell: headache severe at night, with throbbing pain behind left eye. On 2nd March seen by exhibitor; no pus in nose or turbinal swelling; tenderness over left frontal sinus; the sinuses did not illuminate and X-rays showed blurring of all the sinuses. On 3rd March frequent vomiting; pulse 38, early left optic neuritis: slow speech: absence of contralateral abdominal reflex and presence of Babinski's sign on right side. On the two last points Dr Bramwell based his diagnosis. Operation: pus under pressure in left frontal sinus; cerebral wall removed; granulations found on outer surface of dura mater and a large quantity of odourless pus evacuated from left frontal lobe (*pneumococcus*); recovery.

The PRESIDENT was interested in the fact that, though the pus was under considerable tension in the frontal sinus, there was no pus in the nose and no middle turbinal swelling.

Dr ADAM asked if contralateral absence of abdominal reflex and the presence of Babinski's sign were characteristic of frontal lobe abscess. If he was not mistaken they might occur in a large temporo-sphenoidal abscess, causing pressure on the ascending frontal convolution.

Dr J. S. FRASER (in reply) regretted that Dr Bramwell's absence prevented an answer to the neurological questions. He (the speaker) had operated under instructions, and somewhat unwillingly. He saw no pus in the nose, and the X-rays gave no help, but Dr Bramwell was certain of his diagnosis.

## **Four Cases of Middle Ear Suppuration with Intracranial Complications.**

1. *Female, aged 55, with left acute otitis media and anterior central perforation; extra-dural and temporo-sphenoidal abscess*—Dr J. S. FRASER.—On 5th March patient was admitted. She became drowsy, complained of headache, and vomited occasionally. There was no ocular or other

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motor paralysis; discs normal, cerebro-spinal fluid normal; temperature slightly elevated. Operation: mastoid sclerotic, and no pus in an inflamed antrum; dura mater over roof, healthy, but further forwards a large extra-dural abscess and a bone cell in the roof of the aditus contained pus. After operation, vomiting, subnormal temperature and sensory aphasia; evacuation of a large non-fetid temporo-sphenoidal abscess (22nd March). Recovery.

2. *Boy, aged 6, with right chronic middle ear suppuration and a temporo-sphenoidal abscess*—Dr DOUGLAS GUTHRIE.—(Published *Journ. of Laryngology*, August 1922, p. 415.)

3. *Male, aged 37, with right chronic middle ear suppuration, anterior perforation, subperiosteal and extra-dural abscess of middle fossa*—Dr EWART MARTIN.—At operation a small hole was found in the squamous temporal above and in front of the meatus at the root of the zygoma, through which pus was oozing; there was also a perforation in the roof of the aditus; a large exposure of dura mater was made with evacuation of the extra-dural abscess; recovery.

4. *Female, aged 6, with bilateral chronic middle ear suppuration, left perisinus abscess and septic thrombosis of jugular bulb*—Shown by Dr STEPHEN YOUNG.—On 2nd April cessation of discharge from left ear with pain and vomiting; no rigors, slight neck rigidity, temperature 102 F. Child too restless for detailed examination. First operation by Dr FRASER: cholesteatoma, perisinus abscess with discoloured sinus wall; incision, but immediate free hæmorrhage. Signs suggesting meningitis showed themselves, but throughout illness cerebro-spinal fluid was free from cells and organisms. Second and third operations: ligature of internal jugular, and later, opening of vein and evacuation of pus from the bulb. General septic condition continued; bulb again explored and pus found. Cerebellar hernia developed in consequence of sloughing of dura mater; recovery.

Dr J. S. FRASER said that he had regarded a mucoid middle ear discharge with an anterior perforation as "not dangerous"; intracranial complications were not likely to develop; he had not previously seen a complication. He did not think that there was a cerebellar abscess in the case shown by Dr Young, and he proposed to adopt an expectant attitude.

Dr DOUGLAS GUTHRIE wished to have the experience of members in regard to the presence of healthy dura mater overlying the middle ear cleft. He had traced no track of infection. An interesting feature in the case was the child's sudden return to consciousness three weeks after operation.

Dr EWART MARTIN said that in his case the peri-auricular abscess and the anterior perforation caused him to suspect a furuncle rather than a mastoid complication. He thought a discussion on the drainage of brain abscesses would be interesting.



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Dr STEPHEN YOUNG said that the child shown by him had developed, with the cerebellar hernia, rotatory and horizontal nystagmus to the affected side and bilateral choked disc. There was no sickness, vomiting, or headache.

## **Congenital Specific Deafness showing Hennebert's Sign—**

Dr J. S. FRASER.—Female, aged 15, with a previous history of bilateral middle ear suppuration, now healed, both membranes showing retracted scars. There was nerve deafness, old interstitial keratitis, but atypical teeth. Wassermann reaction was very weakly positive. Rotation both to right and to left induced no after-nystagmus; cold syringing of right ear induced slight nystagmus in one minute. There was a well-marked fistula symptom especially on aspiration.

Dr A. A. GRAY said this was obviously a case of congenital syphilis, although the teeth were not characteristic. He never considered the absence of Hutchinson teeth as indicating the absence of syphilis; the Wassermann too was frequently negative. He presumed that the keratitis came on before the deafness. He would like to know if the deafness ever preceded the keratitis; it had an important practical bearing, because if salvarsan were used when keratitis was observed it might be possible to prevent the deafness.

Dr J. S. FRASER said that the occasional presence of Hennebert's sign was interesting. Although there was no after-rotation nystagmus and a feeble response to the caloric test, there was a well-marked fistula symptom in the absence of suppuration and of cholesteatoma, and presumably of erosion of the lateral canal. The sign had been attributed to undue laxity of the stapes or to some obscure nervous condition. In reply to Dr Gray, he said that in all the cases of congenital syphilis which he had seen, interstitial keratitis was present.

**Paralysis of the Right Vocal Cord following Cancer of the Mamma**—Dr J. M. DARLING.—(Published in *Journ. of Laryngology*, October 1922, p. 516.)

Dr LOGAN TURNER agreed with Dr Darling's resumé of the probable route of infection, and it was interesting to find the supraclavicular glands enlarged. They formed an important link in the chain of infection. Whether the cancer had permeated from them to the chain of glands accompanying the recurrent laryngeal nerve, or whether the most internal of the supraclavicular glands pressed directly on the recurrent nerve in the neck, it was difficult to say.

**The Radical Mastoid Operation Cavity with Epithelial Inlay**—Dr DOUGLAS GUTHRIE.—The method adopted was described by Dr Hamilton White in the *Journ. of Laryngology*, May 1922. A cast of the cavity was taken in dental wax and then replaced, covered with the epithelial graft.

Dr J. S. FRASER asked Dr Guthrie if he found it easy to remove the stent. It would be a great disadvantage if the wound had to be

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left open or reopened for its removal. He was satisfied with the use of iodoform worsted packed on to the graft.

Dr EWART MARTIN had seen Mosher of Boston perform the operation. He left the wound unstitched and closed it about the fifth day; he also plugged with teased-out wool and soft paraffin, the latter keeping fairly soft by the heat of the tissues.

Dr W. T. GARDINER said that the patient had had a good deal of pain after the operation. Did Dr Guthrie remove the stent under general anaesthesia?

Dr GUTHRIE (in reply) said it was not easy to remove the stent through the meatus unless divided before insertion. There was no need to open up the wound. The stent broke of itself into small portions, and after a week it seemed to crumble. He did not think the patient had suffered undue pain, and no opiate was required, nor had he given a general anaesthetic for removal of the stent.

**Chronic Hyperplasia of the superior Maxilla**—Dr DOUGLAS GUTHRIE.—Female, aged 16, with a smooth, hard, painless swelling of the left upper jaw, of one year's duration. It affected mainly the canine fossa; mouth, palate and nasal cavity are normal and the teeth good. Incision revealed soft spongy bone, and no antral cavity was discovered. The pathologist reported normal bone with the cancellous spaces filled with fibrous tissue. The case conforms to Westmacott's description.

Dr W. S. SYME had seen several cases of thickening of the upper jaw, and suggested that the antrum was a suppurating focus. On the other hand, the case might be a dental cyst.

Dr BROWN KELLY had seen a case of increased bony growth, and had removed soft cancellous bone with a good result. This case did not appear to him to conform to Westmacott's hyperplasia. In these cases there was great broadening of the alveolar edge, and the teeth seemed sunken in the wide plateau. At first sight this case resembled a dental cyst without the parchment crackling and bogginess.

Mr J. J. M. SHAW recounted the case of a man who suffered for nine years from a slowly growing enlargement of the right maxilla. The pathologist reported a diffuse osteoma. The mandible and temporal bone of the same side became enlarged, and were reported on microscopically as identical with the appearances in leontiasis ossea. He suggested the possibility of a similar condition in this case.

Dr DOUGLAS GUTHRIE (in reply) said that the Wassermann test was not made. He had satisfied himself that there was no antrum. The rounded alveolar border referred to by Dr Kelly was removed by the speaker. He would watch the case in connection with the later development of anything suggesting leontiasis ossea.

**Tuberculosis of Tongue, Mouth and Larynx**—Mr J. D. LITHGOW.—Girl, aged 9½, showed a diffuse nodular infiltration of the

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dorsum of the tongue, mouth, soft palate and larynx. Sections of the tissue demonstrated abundant lymphoid, epithelioid and well-formed giant cells.

Dr BROWN KELLY asked why the condition had not been labelled lupus. The nasal mucosa was also affected, but the most unusual feature was the implication of the tongue. Tubercle of the tongue was a rare condition characterised by the presence of small ulcers or fissures.

Dr SYME agreed with Dr Kelly's views. He (the speaker) had seen recently a tuberculoma of the tongue in a boy of 15. It formed a pale, firm swelling.

Dr HOWIE suggested the use of acid nitrate of mercury ; it did well in these cases.

Mr LITHGOW (in reply) said he saw no special advantage in calling the condition lupus. The patient had tuberculosis of the lungs, and the pathologist reported that it was ordinary tuberculous tissue.

## **Chronic Middle Ear Suppuration with Extensive Absorption of Bone and Invasion of the Brain with Cholesteatoma—**

Dr EWART MARTIN.—Male, aged 27, with discharge from left ear following shell explosion in 1917. At the operation in 1922, there was found a fistula in the lateral canal, exposure of the facial nerve, absence of the posterior meatal wall, exposure of the middle and posterior fossa dura mater which was eroded, while the cholesteatoma invaded the convolutions with leakage of cerebro-spinal fluid. The sigmoid sinus was obliterated. The patient had suffered from fits, which had ceased since the operation, but there was still marked irritability of the labyrinth. Suggestions as to further treatment were desired.

Dr J. S. FRASER suggested that Dr Martin should do nothing further in the meantime ; the operation had been done quite recently, and it was wiser to leave the granulations alone.

## **Treatment of Chronic Middle Ear Suppuration by Ionisation—Dr STEPHEN YOUNG.**

Dr YOUNG said that all the cases in the series had been previously treated by conservative methods without response. Out of 25 which had been ionised more than one and a half months ago, 11 were completely cured, 4 improved, 8 failed to improve, and 2 did not report. The most suitable case was that in which there was no risk of re-infection from the nose or mastoid antrum. Those with large central perforations did best, not so with the anterior perforation. The zinc solution must come in contact with the whole suppurating surface. The ear was first syringed and cleaned with zinc solution. The patient then lay on a couch, and the speculum with the zinc positive pole attached was inserted into the meatus, the ear being first filled with the zinc solution. The current is raised to 3 milliampères, allowed to remain for eight minutes, and then reduced. Slight giddiness may follow. Only one, or at the most two, séances are required. The ear is afterwards kept dry.

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Dr J. S. FRASER thought that 50 per cent. of chronic cases could be cured by the ordinary "wet" conservative methods, of the remaining 50 per cent. half, *i.e.*, 25 per cent. of the whole appeared curable by ionisation, leaving 25 per cent. not curable by either method.

**Carcinoma of the Left Vocal Cord; Laryngo-fissure**—Dr W. T. GARDINER.—Male, with small sessile tumour on the middle of the left vocal cord resembling a fibroma, first seen in 1919 and regarded as simple. Patient was again seen in December 1921, when the tumour was removed by the direct method. The pathologist reported epithelioma; laryngo-fissure was performed; no recurrence.

**Localised Meningitis of Left Motor Cortex with Contralateral Paralysis secondary to Furunculosis of the Left External Auditory Meatus**—Dr D. E. S. WISHART (introduced by Dr Gardiner)—Male, aged 16, with pain in the left ear for one week and swelling above and behind auricle. Development of fever, delirium, and stupor followed by paralysis: ptosis of right eyelid, right internal rectus, right side of face and tongue. No paresis of limbs or trunk. Left temporo-sphenoidal lobe was explored with negative result. The cerebro-spinal fluid was turbid. Post-mortem revealed an acute basal streptococcal meningitis with a definite collection of pus localised over the lower third of the left motor cortex. The interest in the case lay in the character of the initial septic focus and in the localised area of meningitis causing paralysis.

### ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

May 19th, 1922.

*President*—Dr A. LOGAN TURNER.

(The Discussion on Mr George Wilkinson's paper on "The Analysis of Sound by Resonance." appeared on page 480, *Journal of Laryngology*, September 1922.)

**Specimen of Left Internal Auditory Meatus dilated and occupied by New Growth, involving the Auditory Nerve**—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—The case of cerebello-pontine tumour from which this specimen was taken presented many features of left-sided cerebellar disease. The ear tests were as follows:—Hearing: right ear, normal: left ear, complete deafness. Tuning fork on vertex was referred to the right ear. Vestibular nerve: a fine spontaneous nystagmus to the right and a coarse nystagmus to the left. Cold air testing: right ear, lateral canal, induced nystagmus after 30" (normal); vertical canal, induced nystagmus after 90"

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(delayed). Left ear, no induced nystagmus from lateral and vertical canals after 60". Intense optic neuritis was present and there was paralysis of the 5th C.N.

The involvement of the fibres from the opposite (right) vertical canals in accordance with the current views suggests a cerebello-pontine tumour in the pons; these fibres are believed to run near the middle line, and, therefore, to be liable to compression by a tumour pressing on the parts. The corresponding track for the horizontal canal lies in the medulla and further from the middle line.

Dr A. A. GRAY said that tumours of the cerebello-pontine angle would have more attention in the future. Everyone must have missed cases in the past from ignorance of the symptoms. More light was now being thrown upon them. One of the difficulties in diagnosis was due to the long duration of the symptoms.

**Malignant Disease of the Temporal Bone with Involvement of Cranial Nerves**—Dr J. S. COLLIER and LIONEL COLLEDGE, F.R.C.S.—Male, aged 40, was seen on 21st February 1922, with headache and pain in the frontal region and with right facial paralysis. Deafness in right ear absolute. A red mass filled the deep part of the external meatus. The man was rather drowsy, with sluggish but equal pupils; no optic neuritis. The mastoid process and middle ear were full of growth, and the facial nerve exposed for about  $\frac{1}{2}$  in. There was a fistula in the lateral canal, and the canals were filled with growth. The dura mater of the middle fossa was covered with it over an area of 1 in.  $\times$   $\frac{1}{2}$  in. Further, the tumour extended between the inner and outer tables of the skull in every direction. The operation was therefore abandoned. Three weeks later, a boss the size of a crown piece appeared on the right frontal bone, and another just above the right ear. Difficulty in swallowing, and paralysis of the right half of the palate and both sides of the tongue, supervened. The right vocal cord was paralysed and weakness of the sterno-mastoid and trapezius appeared. The right cranial nerves, from 7th to 12th, are involved. Some stiffness of the neck suggests extension to the occipito-atlantal joint. The pathologist was unable to give a diagnostic opinion.

**Right Facio-Hypoglossal Anastomosis**—Mr LIONEL COLLEDGE, F.R.C.S.—Girl, aged 16, was operated upon a year ago for mastoid disease and staphylococcal meningitis secondary to sup-puration in the labyrinth of the right ear. The cochlea was opened and found full of pus. The facial nerve was not seen, but a complete facial palsy resulted. As this showed no improvement after six months and the reaction of degeneration was present, the hypoglossal nerve was divided and the central end anastomosed to the peripheral end of the facial. The peripheral end of the hypoglossal was anastomosed

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to a slip from the spinal accessory. Some wasting of the right half of the tongue followed, but this is now very slight. Patient complained temporarily of discomfort in the shoulder, but the sternomastoid was more affected than the trapezius. Six months later, tone has returned to the facial muscles at rest, and movements of the tongue are associated with movements of the right half of the face, but there is dissociated voluntary control of the side of the face.

Dr DAN M'KENZIE said that dissociated movements were undoubtedly present in this case. One corner of the girl's mouth moved without any movement of tongue or shoulder. The operation failed in obtaining for the face the movement due to an emotion apart from the patient's direct volition. The most striking change after anastomosis was the improvement in the tonus of the face. The orbicularis palpebrarum in this case might yet improve. When should the operation be done? By delay the muscles atrophied unless nutrition was maintained by massage and electricity; after two or three years the operation failed, because the muscles had lost their function. If one operated early, the result was not very good; and most of the cases which were not operated upon at all regained considerable movement of the face after a period of time.

Dr A. A. Gray said that the absence of emotional expression took much from the charm of the face, and from the charm of the operation also. He agreed it was extraordinary how these cases recovered function without operation even many months after the paralysis occurred.

**Cerebellar Hernia**—Dr DAN M'KENZIE.—Girl, aged 15, had operation three months ago for symptoms of pronounced meningitis. Fœtid pus in the mastoid cells was traced into a large cerebellar abscess cavity. This was drained. Patient was not under exhibitor's observation during convalescence. About a month ago hernia developed.

In these cases Sir Charles Ballance advised enlargement of the opening in the dura mater; subsidence followed and the skin could be united over the gap.

Mr CLEMINSON said he had seen a case in which a decompression operation was done with good effect on the opposite side of the head.

**Otogenic Meningitis spreading from the Roof of the Antro-Tympanum**—Dr DAN M'KENZIE.—Female, aged 28, admitted with double mastoiditis. She died of meningitis five days later. The case is reported, as some doubt has been expressed as to whether meningitis ever does start from the roof of the antro-tympanum.

*Post-Mortem Report*.—Pia mater; on the surface of the right temporo-sphenoidal lobe the pia mater applied to the surface of the dura mater over the tympanum held in its meshes a thick lymph; its surface was rough and taggy, an infiltrate extending out over an area of 1 inch or more; granular yellow lymph extended along the

# Nose

sinuses and had accumulated at the vertex on that side. Dura mater; after stripping this, swelling and loss of lustre was observed at the site of attachment to the roof of the tympanum. The pia was adherent to this area of the dura by very recent tags of fibrinous exudate. The sinuses were free from ante-mortem clotting. Section of the post-mortem clot showed no abnormality. The dura mater over the sinus had retained its lustre and healthy appearance. Bone: the roof of the tympanum was the seat of a circular opening  $\frac{3}{4}$  in. diameter. The bone was spongy, where normally dense and eburnated, and its edge was uneven at the internal quadrant. The area showed an ischæmia, and the substance a sandy, crumbling consistence of necrotic bone.

*Notes.*—There can be no doubt of the primary osteomyelitis extending beyond the area of operation. This had set up by organisation a path of distribution through the dura to the pia mater. The bone of the roof was crumbly, spongy and cancellous, unlike the more common egg-shell bone. The sinuses were thoroughly searched and contained no tittle of evidence of septic thrombosis. The base was peculiarly free from all infiltration of lymph and the cisterna contained clear fluid.

## ABSTRACTS

### NOSE

*The Treatment of Paroxysmal Rhinorrhœa (Vaso-motor Rhinitis) by Alcohol Injections into the Spheno-Palatine Ganglion.* FEIN (Vienna) (*Verhandl. d. Gesellsch. Deutsch. Hals-, Nasen-, und Ohrenärzte*, p. 146, May 1921.) Leipzig: Kurt Kabitsch.

The spheno-palatine ganglion lies in the spheno-palatine foramen behind the posterior end of the middle turbinal, and sends the greater part of the nasal branches anteriorly and inferiorly along the lateral wall of the nose as well as into the posterior regions.

To reach the ganglion with the needle a portion of the inferior or of the middle turbinal must be sacrificed. (The details of the operation are not given.)

Only two cases had been treated, one with very great benefit.

Discussing this paper Bönninghaus cogently pointed out that the symptoms of the condition indicate an irritation of the area supplied, not by the branches of the spheno-palatine ganglion, but by those of the ethmoidal branches of the first division of the fifth cranial nerve. (This was the rationale of the treatment of vaso-motor rhinitis carried out some years ago by Yonge of Liverpool, D.M.)

## Abstracts

Several subsequent speakers reported that they had obtained good results in this disease from the use of methylatropin nitrate ("Eumydrin") internally.

DAN M'KENZIE.

### LARYNX.

*The X-ray Treatment of Tuberculosis of the Larynx.* Zange, Kander, and Discussion (*Verhandl. d. Gesellsch. Deutsch. Hals-, Nasen-, und Ohrenärzte*, p. 61, May 1921.) Leipzig: Kurt Kabitsch.

Zange said: Tubercle bacilli are not killed by X-ray radiation, but tuberculous granulations are affected, particularly if there is much round-cell infiltration, part being destroyed and part cicatrizing according to the dose. "Effectively irritative" doses only can be expected to have any result. The higher doses, although still more beneficial, cannot be employed by reason of their irritative action on the skin.

The sensibility of laryngeal tuberculosis to X-rays varies with each case and can only be learned by experience. In the normal larynx the arytenoid region is more sensitive than the other parts, and this is especially so when it is tuberculous. Deposits on the posterior wall of a pachydermatous type are less sensitive than deposits elsewhere. It is not possible to irradiate the whole larynx equally by external application, because of the different depth of the various regions from the surface, and deposits on the posterior wall are always least affected.

It is necessary to defer each succeeding exposure until the reaction from the earlier one has disappeared, and this is difficult to estimate because the signs of reaction resemble the signs of the disease itself, and reactionary inflammation may still be present although all indications of reaction may have disappeared. With careful dosage under continual supervision the X-rays are one of the best remedies for the disease.

Thirty cases had been treated by him, most of them advanced. Twenty-five underwent improvement, six of which manifested simultaneous improvement of the pulmonary disease and of the general condition. Two cases remained uninfluenced, and three became worse in spite of—or because of—the treatment. All varieties of tubercle of the larynx were treated; in most, the ulcers closed and cicatrized, and infiltration diminished; a few did badly, with widely-spreading ulceration. Sixteen so-called "closed" (*i.e.*, non-ulcerated) cases improved, six of them being "as good as healed."

As regards the application, irradiation was effected from without through two lateral areas, 6 by 8 cm., alternately, at the same sitting. The first exposure was of 40 per cent. "skin-erythema dose," but if the arytenoids or epiglottis were tuberculous, a lower dose was employed. Later on, 50 per cent. to 100 per cent. "skin-erythema



## Peroral Endoscopy

doses" were employed and were the most effective. Intervals were made of six to eight weeks or longer, according to the reaction.

In several cases recurrence of the disease occurred after healing, doubtless because the tubercle bacilli were not destroyed.

Kander used hard rays filtered at first through 8 mm. of aluminium, later through 0.5 mm. of zinc and 1 mm. of aluminium in order to avoid irritative reaction of the mucous membrane. According to the state of the patient's nutrition the dose varied from  $\frac{1}{5}$  to  $\frac{1}{8}$  or  $\frac{1}{1000}$  of an erythema dose. He used a Veifa intensive apparatus, Coolidge tubes, a secondary tension of 180,000 volts with 2 to  $2\frac{1}{2}$  milliampères, with the filters already mentioned, reaching the height of the desired dose in eight to ten minutes. The treatment was continued at intervals of two to three weeks for from three to six months. No other treatment was employed.

Eighteen cases were dealt with: of these, two underwent complete healing, and remained well up to the time of writing. In neither of them did the sputum contain tubercle bacilli. One showed a large ulcer with granulations on the posterior wall and perichondritis of the left arytenoid cartilage. The second showed general infiltration of a type that may be called "lupus" of the larynx, but with ulceration and granulations.

The other cases were still under treatment, but a number had improved. None of the cases had been made worse by the treatment.

DAN M'KENZIE.

### PERORAL ENDOSCOPY.

*Foreign Bodies of Dental Origin in the Bronchi.* CARL P. HEDBLÖM.  
(*Journ. of Dental Research*, Sept. 1921.)

The writer mentions 55 cases which have come to his notice. The foreign body was a natural or artificial tooth in 43 cases, and the list also includes dentures, fillings, burs, cement, and a broken blade of forceps. The location was the right bronchus in 23 cases, the left bronchus in 20, in the remaining cases the position was not noted. In 18 cases the foreign body was expelled spontaneously. There were 15 deaths in the series.

DOUGLAS GUTHRIE.

*Prognosis of Foreign Body in the Lung.* CHEVALIER JACKSON, M.D.,  
Philadelphia. (*Journ. A.M.A.*, Vol. lxxvii., No. 18, 8th October 1921.)

A prolonged sojourn of a foreign body may give a complete clinical picture of pulmonary tuberculosis even to fatal hemoptysis. The character and properties, physical and clinical of the foreign body,

## Abstracts

constitute the most important factor in prognosis, the pathological changes resulting are dependent on (1) the degree of the obstruction to drainage and æration of the tributary lung tissue; (2) the reaction the tissues manifest to the presence of the particular foreign body. Peanut kernels are very irritating, while metallic bodies cause little specific action. A smooth, dense insoluble inorganic substance causes no trauma and little reaction for a long time if drainage and æration are not interfered with. A sharp fragment may be followed by serious consequence, and a grave prognosis if not removed within a few weeks. A case is recorded in which a bullet was removed from a boy, 17 years of age, who, fifteen months previously, was shot in the back between the 7th and 8th rib 8 cm. to the right of the spine. Profuse hæmorrhage followed the entrance of the bullet, but it ceased under rest in bed. After two weeks the only symptom present was pain in the chest. Chest examination showed no physical sign or any pathological condition secondary to a foreign body.

Under local anæsthesia the bronchoscope was passed through the mouth into the right inferior lobe bronchus to a distance of 2 cm. below the orifice of the middle lobe bronchus. The bullet was reached by forceps, detached from its fibrous tissue, and removed along with the bronchoscope through the mouth. The after-history was uneventful.

The author's conclusions are as follows:—

- (1) The prognosis of unremoved foreign body in the lung is grave.
- (2) About 2 per cent. of foreign bodies are coughed up, and in these cases the prognosis is good: but this fortunate termination is too rare to justify waiting, in view of the fact that bronchoscopy in 98 per cent. is successful. As between thoracotomy and waiting for spontaneous expulsion that may never happen, the prognosis of the latter course is less serious.
- (3) The prognosis of thoracotomy for removal of aspirated foreign bodies, so far as can be determined, is extremely grave. For penetrating foreign bodies, it is so grave as to be inadvisable unless suppuration has intervened.
- (4) The prognosis as to bronchoscopic removal of the aspirated foreign bodies is very good (98 per cent. of removals). It may be said that almost any localisable foreign body that has gone down the natural passages can be brought up the same way. The prognosis as to recovery after removal is excellent (98.3 per cent. recoveries). Of 44 cases complicated by abscess or bronchiectasis, in 42 (94.4 per cent.) the patients recovered good health. The risks of a very brief and careful bronchoscopy without general anæsthesia are almost nil.
- (5) The prognosis in a case of penetrating foreign body removed from the lung by bronchoscopy through the mouth, based on the only

## Peroral Endoscopy

case so far thus dealt with, is good. The patient had no hæmorrhage, no rise in temperature, was discharged cured three days after the bronchoscopy, and is still in perfect health. A large series of cases will be required to determine the prognosis. The method is necessarily limited to foreign bodies whose smallest diameter is less than that of the main bronchus of the invaded lung. It can be considered justifiable only after careful localisation and studies of lung-mapping in the particular case; otherwise fatal hæmorrhage may be encountered.

PERRY GOLDSMITH.

*Foreign Bodies in the Œsophagus.* Dr. J. GUISEZ, Paris. (*Bulletin d'Oto-Rhino-Laryngologie*, Paris, September 1921.)

A girl of 19 had swallowed fragments of an electric bulb in an attempt at suicide. Four days later she had severe dysphagia, temperature 101°, and some head retraction. By direct œsophagoscopy overcoming considerable spasm, a putrid slough of the posterior wall of the œsophagus was found 10 cm. from the ostium. Fragments of glass were removed from this region, and the site cleaned. Four days later symptoms recurred. By direct œsophagoscopy, a fistula discharging pus was observed at the site of the former slough. This was dilated with forceps, and a wineglass full of stinking pus gushed out. Recovery was uneventful.

The author records that he has operated on 12 cases of œsophageal abscess by the direct route. In one case more than a pint of pus was evacuated. He insists on the importance of the supine position, with the head lowered for these operations, to avoid asphyxiation. He regards the prognosis of these cases as favourable: diffuse mediastinitis is, however, invariably fatal.

E. WATSON-WILLIAMS.

*Œsophageal Abscess.* Dr J. GUISEZ, Paris. (*Bulletin d'Oto-Rhino-Laryngologie*, Paris, January 1922.)

In a very lucid article the author gives us his experience of 50 cases of œsophageal abscess. He details 5 cases of unusual interest, all following impaction of foreign bodies. All these were cases of large abscess evacuated by the œsophagoscopic tube. The appearances are fully described and several illustrations given.

The site of the abscess is always in the upper third of the œsophagus. First, because this is the commonest site of impaction; secondly, because inflammation lower down produces a mediastinitis and not a circumscribed purulent collection. As Dr Guisez has seen them, they occur always on the posterior wall but may extend laterally.

## Abstracts

Projection forwards may occlude the œsophagus and compress the trachea: œdema plays a part in these complications.

Œsophageal abscess is always secondary to trauma, and usually to impaction of a bone (meat, game, or fish). Tooth-plates and round smooth objects such as coins do not appear to produce it. The author records the case of an infant who died from an abscess that followed the blind use of a "coin-catcher" (the coin was found in the colon!) Distinction must be made from prevertebral abscess, or deep suppuration in the neck glands. In these there is not the severe dysphagia. The œsophagoscope is essential for diagnosis and treatment. The swelling is incised, and any quantity of pus up to half a litre may be evacuated. Subsequent progress is usually favourable.

Four types of œsophageal abscess may be distinguished.

(1) The small or submucous. These often rupture spontaneously. The symptoms are slight, mainly some dysphagia. The prognosis is good.

(2) The large or extra-muscular. The collection forms between the muscular wall of the gullet and the adventitious connective tissue without tending to spread along the deep cellular planes. Intense or complete dysphagia and a fetid breath are prominent, but general disturbance is less than one would suppose. The risk is that rupture may drown the patient.

(3) Occasionally true periesophageal collections occur. The author supposes that in such cases the original trauma carried infection through the adventitious coat of the œsophagus. The deep planes of the neck are infected. Prognosis is grave.

(4) Interstitial phlegmonous œsophagitis, the infective process spreading between the layers of the œsophageal wall; this is rare, rapid, and fatal.

E. WATSON-WILLIAMS.

*The Clinical Picture of Œsophageal Atresia.* F. GÖPPERT, Göttingen. Münch. Med. Wochens, Nr. 57., Jahr. 68.)

The author maintains that these cases are often undiagnosed in life though the symptoms are typical.

The doctor is usually called because the infant vomits, more seldom because it cannot swallow. Oral inspection reveals a thick mixture of mucus and milk, a fact which should of itself be sufficient to establish the diagnosis as it is not found under any other conditions. If a meal be given the respiratory distress at once becomes evident. During the first two days the child resists each effort at swallowing, by choking and general agitation, but these protective efforts gradually cease.

Faulty diagnosis may be excluded by the careful passage of a bougie.

JAMES B. HORGAN.

# Peroral Endoscopy

*Plastic Operation on the Œsophagus, the Method and its successful Execution.* PAUL FRANGENHEIM. (Münch. Med. Wochens. Nr. 9., Jahr. 69.)

After reviewing the various methods employed, the author gives details of a successful case of this kind carried out by himself after the manner of Roux. The operation was carried to a successful conclusion in three sittings, extending over a period of eight weeks.

The patient, a boy of 6½ years, had swallowed some soda solution eighteen months previously: six months later he began to experience difficulty in swallowing. This was temporarily relieved by the passage of bougies which enabled the child to take liquid nutriment. Fourteen days before admission his troubles had become accentuated, everything being rejected. The screen showed stenosis at the level of the bifurcation of the left bronchus. It was no longer possible to pass a bougie.

In the first instance, a gastric fistula was established through the left rectus near the cardia. An attempt to establish a continuous bougienage through the fistula proved futile.

14th March 1921: Separation of a loop of the small intestine, the continuity of which latter was at once re-established by lateral anastomosis. The lateral aspect of the separated loop was now united with the wall of the stomach, its lower and open end being closed by a continuous suture. The extended loop was now prolonged upwards beneath the undermined skin of the chest and reached as far as the jugular fossa.

14th April 1921: Transverse division of the cervical œsophagus. The distal end having been sewn up was buried, and the proximal end having been brought forward, was fixed in a circular manner to the skin of the neck.

9th May 1921: Attachment of the œsophagus to the upper end of the separated loop of gut by means of a flap of skin, in shape resembling the wing of a deer (türflügelartig).

On 19th January 1921 the patient was discharged. His artificial œsophagus was functioning very well and he was able to eat most foods.

13th January 1921: The gastric fistula is closed. The new food passage is working very well. The intestinal loop lying under the skin shows well-marked peristalsis.

Up to the present there are literary records of 28 successful cases of œsophageal plastic operations of various kinds. In one case the cutaneous portion of the artificial gullet caused troublesome irritation, and one female patient experienced serious difficulty owing to the onset of the vomiting of pregnancy ten years after the operation was performed.

JAMES B. HORGAN.

## LETTER TO THE EDITORS

TO THE EDITORS,

*The Journal of Laryngology.*

SIRS,—I have just received the Journal with Mr Tilley's reply to my last letter on "The Blood-Clot Method of Closing the Mastoid." Of course I accept Mr Tilley's statements, but they do not satisfy me. In doing a simple mastoid operation, I hold that evacuation of the muco-pus and complete exenteration of the mastoid process are not all we aim at. We aim at complete restoration of the middle ear, and I cannot see how this method secures it. I have done over four hundred mastoid operations, most of which have been the simple operation, and the resulting condition of the middle ear and hearing in most leave nothing to be desired. If I could be sure of the same results with the immediate closure method I would willingly adopt it, for the after-dressing would be so much lessened.

T. A. MACGIBBON.

CHRISTCHURCH, N.Z.

## OBITUARY

ALEXANDER GRAHAM BELL, HON. LL.D. (EDIN.)

It is fitting that the *Journal* should pay tribute to the life and work of Alexander Graham Bell, inventor of the telephone, who died on 1st August at Baddeck, Nova Scotia.

Born in 1847 in Edinburgh, where he received his early education at the High School and the University, in 1870 he emigrated to Canada on account of his health, and, along with his father, he took up residence in the town of Brantford, Ontario.

The lines of scientific research, which brought distinction and fame to the younger Bell, doubtless had been stimulated and fostered by the work of his father, Melville Bell, who had attained some celebrity by reason of his scientific analysis of the elements of speech, and through the introduction of methods directed towards the alleviation of deafness. Engaged in the study of audition and elocution, Graham Bell turned his attention towards improving the means of rendering the sound of the human voice intelligible to the deaf and dumb.

It was but a further step in the development of his thesis, to study

## General Notes

the properties of artificial diaphragms capable of picking up sound waves generated by the voice, and, when transmitted along the electric wire, retranslating them into the terms of human speech at distances far beyond the range at which the voice was able to carry. Success attended his labours, and, in 1876, at the Philadelphia Centennial Exhibition, the telephone was on view ; it is interesting to record that the late Lord Kelvin was present and witnessed the first public demonstration of its use.

"Amongst the achievements of modern science none is more wonderful or beneficent than the removal of the barriers which disease and distance alike present to the transmission of human speech ; it is a two-fold triumph." In these words, which briefly summarise Graham Bell's most brilliant results, the Dean of the Faculty of Law presented him, in 1906, for the Honorary Degree of Doctor of Laws of the University of his native city. Science has progressed since 1876, and the electric wire is no longer a necessary link in the chain of telephonic communication, but this in no sense minimises the discovery of Bell.

Amongst his other inventions he produced the photophone, and he was in part responsible for the introduction of the gramophone. During the War he directed his attention and applied his genius in other directions, designing a submarine chaser capable of attaining great speed while under water.

Graham Bell was the recipient of many honours, but his greatest reward lay in the knowledge that he had been able to give humanity one of the most valuable and beneficent inventions of science. He is buried at Cape Breton upon a mountain top, his tomb blasted out of solid rock.

A. L. T.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W. 1.

*Section of Otology*—President, Mr Hunter F. Tod, F.R.C.S. *Hon. Secretaries*, Mr F. J. Cleminson, M.Ch., and Mr Archer Ryland, F.R.C.S.E.

The First Meeting of the Section will be held at 1 Wimpole Street, on Friday, 20th October, at 5 P.M.

Members who propose to show patients, specimens, etc., should communicate with the Senior Secretary, Mr F. J. Cleminson, 32 Harley Street, London, W.1, at least twelve days before the Meeting.

*Section of Laryngology*—President, Mr Charles A. Parker, F.R.C.S.Ed. *Hon. Secretaries*, Mr T. B. Layton, D.S.O., M.S., and Mr J. F. O'Malley, F.R.C.S.

The First Meeting of the Section will be held at 1 Wimpole Street, on Friday, 3rd November, at 4.45 P.M.

## General Notes

Members desirous of showing patients or specimens should communicate with the Senior Secretary, Mr T. B. Layton, M.S., 10 Welbeck Street, London, W.1., at least twelve days before the Meeting.

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### BRITISH MEDICAL ASSOCIATION.

At the Annual Meeting of the British Medical Association, which was held in Glasgow from 25th to 29th July, the Sections of Otology and of Laryngology attracted large attendances.

The subject of discussion at the *Section of Otology* on 27th July (President, Dr Albert A. Gray) was Septic Sinus Thrombosis.

Introducing the subject, Sir William Milligan urged the importance of early diagnosis, and gave an outline of the present-day treatment.

Mr Lionel Colledge referred in his paper to difficulties of diagnosis, and mentioned examples from his experience.

Professor Holger Mygind, C.B.E., gave statistics of 144 cases, and sought to prove that ligature of the jugular vein had little effect on the prognosis. This statement was, however, challenged by subsequent speakers, the majority of whom advised that the jugular be tied in every case.

Sir James Dundas-Grant did not practise ligature as a routine method; the cases must be selected.

Mr Francis Muecke mentioned the value of anti-streptococcal serum, and Dr Andrew Wylie advised intravenous injections of corrosive sublimate solution.

Other speakers were Dr Dan M'Kenzie, Dr Syme, Dr Albert Gray, Dr Douglas Guthrie, and Dr Ritchie Rodger.

Another interesting discussion followed the paper by Drs J. S. Fraser and Stephen Young—"Is it worth while to remove aural polypi?"

Professor Mygind (Copenhagen) then read his contribution on "Otogenic Meningitis," based on a personal study of 210 cases. The paper will be published *in extenso* in a future number of the Journal.

The *Section of Laryngology* met on the following day (President, Dr John Macintyre).

A discussion on the Symptoms and Diagnosis of Diseases of the (Esophagus was opened by Mr Walter Howarth and Dr D. R. Paterson.

Dr Brown Kelly described his observations on "Cardiospasm"; Dr William Hill stated that primary spasm was "extra-metropolitan," and was never seen in London. Sir St Clair Thomson agreed with Dr Hill, and deplored the impossibility in this country of teaching œsophagoscopy upon the dog.

Sir William Milligan related experiments to show that cardiospasm was due to spastic contraction of the left crus of the diaphragm.

Dr James Adam had observed a case of cancer of the hypopharynx of fifteen years' duration, and suggested that some cases of spasm might at a later date prove to be malignant growth.

Dr Syme had noted œsophageal spasm above the diaphragmatic level.

Dr A. J. Wright's paper on "Congenital Occlusion of the Choanæ," in two members of one family, was discussed by Sir St Clair Thomson, Dr Hutchison, Dr Young, and Dr Syme.



## General Notes

Dr H. H. Forbes (New York) related his experiences with radium in the treatment of cancer of the larynx and œsophagus, and indicated the scope and limitations of the method.

The Presidents of the two Sections gave a dinner on the evening of Thursday, 27th July, at which were present Sir St Clair Thomson, Sir William Milligan, Professor Holger Mygind, C.B.E., Sir James Dundas-Grant, Dr Peter M'Bride, Dr William Hill, and many others. Members will entertain happy memories of this and other social functions at which they enjoyed the delightful hospitality of their Glasgow colleagues. D. G.

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In Sir St Clair Thomson's article on "Oto-Laryngology in France," which appeared in the July number of the Journal, a list was given of the public and private clinics on Diseases of the Ear and Throat, in Paris. The following additional clinics were inadvertently omitted, viz, that of Prof. Reverchon and Prof. Agrégé Worms, Military Specialists, Val de Grâce, and the Private Clinic of Dr Caboche, 11 Rue Leboutoux, Paris.

\* \* \*

Dr D. J. Gibb Wishart has resigned his appointment as Professor of Oto-Laryngology in the University of Toronto. Since his graduation at McGill University, Montreal, in 1885, Dr Wishart has had a long and distinguished professional career, and we regret that he has found it necessary to resign his teaching appointment. Professor Wishart, as Chairman, took an active part in the deliberations of the Committee which conducted an inquiry into the best method of educating the specialist in diseases of the Ear and Throat.

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Dr Perry Goldsmith has been appointed Professor of Oto-Laryngology in succession to Professor Wishart, resigned. Dr Goldsmith is well known in this country. He is an active contributor to the Abstracts Section of the Journal, and we trust that his new duties will not interfere with his activities in that direction. We wish him all success in his new post.

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### BATH EAR, NOSE, AND THROAT HOSPITAL.

The President of the Bath Ear, Nose, and Throat Hospital writes as follows: I am instructed by the Board of Management of this Hospital to inform you, that, at the request of the Secretaries of the Section of Laryngology of the Royal Society of Medicine, they considered at their last meeting the suggestions of that Section with regard to tonsil and adenoid operations, and found themselves in entire agreement.

It is thought it might be of interest to readers of the Journal to know that this Hospital has, for the past two years, been carrying out these suggestions. The Authorities of the Hospital have been enabled to do this since removal to their new premises in 1920, where they have accommodation for fifty in-patients. The Board has always regarded it as a matter of the utmost importance that all patients requiring tonsil and adenoid operations should be treated as in-patients.

## General Notes

Our attention has been drawn to a new publication, entitled "Osmics, the Science of Smell," from the pen of Mr John H. Kenneth, M.A., University of Edinburgh, and published by Messrs Oliver & Boyd. The first number of this periodical, which will appear at intervals, contains a bibliography of 500 papers dealing with the anatomy, physiology, pathology, and psychology of olfaction. The references are not confined to papers which deal merely with the sense of smell in man, but comparative anatomy bulks largely in the list.

"The applications of osmics to everyday human life are manifold, in the testing of food and drugs, in gardening, in the industry of perfumery, in clinical diagnosis, in psycho-analysis and psycho-therapeutics, in education, particularly of the blind and deaf-mutes, to enumerate a few instances." Mr Kenneth has obviously given much time and labour to the production of the first number of his journal, and we look forward to future issues. The subject of olfaction is full of interest.

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### AMERICAN LARYNGOLOGICAL ASSOCIATION.

In the July number of the Journal, the name of Dr Emil Mayer, M.D., New York, was inadvertently omitted from the list of Office-bearers of the American Laryngological Association for 1923. The names should read as follows:—*President*, Emil Mayer, M.D., New York; *First Vice-President*, Dr George Fetterolf, Philadelphia; *Second Vice-President*, Dr Lorenzo B. Lockard, Denver, Colorado; *Secretary*, Dr George M. Coates, Philadelphia; *Librarian*, Dr Joseph H. Bryan, Washington, D.C.; *Treasurer*, Dr J. Payson Clark, Boston, Mass.

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In the *Times* of 19th September, under the heading "Golden Weddings," we notice the following:—

PRITCHARD : PALLISTER.—On the 19th Sept., 1872, at St. James's Church, Gravesend, by the Rev. John Joynes, M.A., URBAN PRITCHARD, M.D., the youngest son of Andrew Pritchard, Esq., of Canonbury, London, to CHARLOTTE (LOTTIE), eldest daughter of BLADES PALLISTER, Esq., of Gravesend. Present address, "St Teresa," Chesham Bois, Bucks.

On behalf of our readers, we offer our warmest congratulations to Mrs Urban Pritchard and to our *cher Maître*, the *doyen* of British Otology.

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### THE LATE DR JAMES DONELAN.

We regret to have to record the death of Dr James Donelan, which occurred suddenly in London on August 25th. Dr Donelan was one of the party of British Otologists who attended the recent Meeting of Congress in Paris, where he appeared to be in the enjoyment of good health. An obituary notice of the deceased will appear in our next number.

# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## ZYGOMATIC MASTOIDITIS.

By W. M. MOLLISON.

THE type of mastoiditis which spreads forward and tends to form a temporal abscess must be fairly common in the experience of all aural surgeons; nevertheless it is curious that more attention has not been directed to it in the text-books. Text-books should reflect the generally accepted teaching and thus be of help to practitioners and students, but reference to recent works on the ear fails to discover mention of "zygomatic" mastoiditis.

The number of cases of mastoiditis presenting swelling in front of and above the ear and involving the temporal fossa is not large compared with the usual type of mastoiditis, but they are sufficiently numerous to demand a description that will allow of their recognition by the student and practitioner. The signs of zygomatic mastoiditis are in many cases completely different from those of the common form. The percentage of such cases is probably about two or three; in the experience of the writer it is higher than that of Bezold's mastoiditis.

Recently, an excellent paper on the subject by Holmgren appeared in the *Acta Laryngologica* entitled, "A Less Noted Type of Mastoiditis." In this paper Holmgren states that twelve cases had been seen in his clinic in a year, but he does not mention what percentage this was of the total number of cases of mastoiditis: he states, in one place, "that this type of mastoiditis is of frequent occurrence," but later he says "cases of zygomatic mastoiditis are far from rare." These two estimates are scarcely similar, and the latter phrase gives a more correct idea of the frequency of the disease.

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That attention should be drawn to this form of mastoiditis will be agreed; it must be within the experience of most aural surgeons to have seen cases of abscess in the temporal region, in which the ear as a possible cause has not been contemplated by the practitioner.

**Symptomatology.**—Clinically, the condition of zygomatic mastoiditis presents very definite features, and the diagnosis should offer little difficulty; sometimes diagnosis is made less obvious owing to the absence of some important symptom or sign (*e.g.* absence of otorrhœa) as may occur in cases of the usual type of mastoid inflammation.

The term “zygomatic” expresses the main features of the condition; in the course of an otitis media, pain is experienced in front of the ear, and a swelling appears in the temporal fossa either immediately in front of the pinna and above the temporo-mandibular joint, or somewhat further forward. The swelling is occasionally so far forward as to appear unconnected with the ear; later, it involves the side of the head up to the insertion of the temporal muscle, and the face, particularly the eyelids: indeed, slight œdema of the eyelids may be perceptible before swelling of the face is noticed.

Owing to the inflammation of the tissues about the temporo-mandibular joint, there is considerable pain and difficulty in opening the mouth and in performing mastication; later still, the skin over the swelling becomes red. Tenderness is marked, especially just in front of the ear over the root of the zygoma; there is often, but not always, tenderness over the mastoid process.

Otorrhœa is generally found, but the writer has seen one case in which no otorrhœa was present, and the tympanic membrane was not much inflamed, though incision yielded pus.

Deafness is always to be noted and is a valuable sign in the absence of otorrhœa; even deafness may be very slight as was the experience in the case of A. B. recorded later.

**Pathology.**—On referring to the literature, one is impressed with the statement in almost all the accounts, that zygomatic mastoiditis occurs in those cases in which the zygomatic cells are unusually developed. Escat mentions the “temporal periosteal abscess” as due to zygomatic cells, and describes its treatment. Denker and Brünings state, “In rare cases, when there is great development of cells in the root of the zygoma, pus can break through under the periosteum.” When discussing acute

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mastoiditis, Barr, in the 1909 edition of his *Diseases of the Ear*, states, "When an abscess forms, the soft parts over the mastoid region and sometimes extensively over the squamous and other parts in the neighbourhood are more or less swollen and cedematous. . . . The bone in the neighbourhood, especially over the root of the zygoma, may be thickened."

This is almost the only reference to the subject in the text-books. In some of the most recent works no reference is to be found to the condition.

French writers have emphasised the zygomatic type of mastoiditis; Escat, as we have seen, mentioned it, and, in 1920, Mouret and Seigneurin wrote a long and full account of the disease; in their paper Luc is quoted as having noted it specially. This paper was published before that of Holmgren, but the latter's work was carried out over the same period.

Though development of the cells in the outer attic wall towards the root of the zygoma is apt to cause the suppuration to spread forwards and so lead to zygomatic mastoiditis, it is by no means necessary that there should be cells in the bone in front of the post-meatal spine in order to produce the condition. In the absence of cells, infection of diploë is sufficient to account for the disease spreading forwards and leading to the formation of a sub-periosteal abscess: it is not obvious why the sub-periosteal abscess should pass so far forward as it sometimes does; perhaps the tension of the temporal muscle and temporal fascia over it has some influence. In the posterior part of the temporal fossa the fibres of the muscle run almost horizontally and are fairly tightly bound to the bone, while, in the centre of the fossa, the fibres are vertical and give more room for inflammatory material to collect underneath.

All cases of zygomatic mastoiditis do not develop abscesses; in the early stage when the squama is the site of inflammation, the bone at operation shows points of either pus or granulation; at a later stage, pus is found under the periosteum, and at a later period still the temporal muscle is found softened and partly replaced by sloughy tissue forming, as it were, the abscess wall.

In some cases these temporal abscesses are found in the middle of the fossa, separated from the points of sepsis in the bone by apparently healthy tissue; no doubt, infection in these cases has been carried by small vessels passing through the bone to the periosteum; indeed it is very doubtful if any so-called

direct spread of suppuration in mastoiditis occurs; it is much more probable that the infection spreads by the blood-vessels. It is possible for infection in the temporal fossa to pass inwards to the dura, and set up an extra-dural abscess or other variety of cranial complication, though such an occurrence is rare. [*Note*.—Ogilvie's case brought before the Section of Otology, the Royal Society of Medicine, 17th February 1922.]

Holmgren publishes several radiograms of the temporal bone demonstrating very well the cells in the squamo-zygomatic portion of the temporal bone. From the study of these radiograms and as the result of anatomical investigations, he finds that these cells may not form a continuous group, but that there may be a separation into two groups, an anterior group quite separated by non-cellular bone from the posterior cells. This observation has an important bearing on the operation; on tracing the infected cells forward, the limit of suppuration may apparently be reached, but on further exploration more suppuration may again be found.

This observation is certainly borne out by operative experience, and no doubt the case of A. B., Case IV., quoted later, was a striking example of complete separation of a small group of cells from the main mass.

The following cases are examples of the condition :—

CASE I.—A boy of 10 developed a small swelling in the right temporal fossa; a few days previously he had had slight earache, but this was only temporary.

The swelling was in the temporal fossa above the zygoma; it was about  $1\frac{1}{2}$  inches in diameter, smooth and tender; the skin was not red over it, nor was fluctuation detected. The boy was deaf, hearing whispered words at a few inches. The tympanic membrane was slightly reddened, but not markedly bulging. The membrane was incised and pus escaped; the mastoid process was then opened; points of suppuration were found throughout the bone especially in the cells of the outer attic wall, and the swelling was found to be due to an abscess under the temporal muscle and periosteum. The boy made an uninterrupted recovery.

CASE II.—Vivian D., aged 12, a schoolboy, contracted influenza and developed pain in the left ear, followed by slight otorrhœa, which ceased after two days. He continued to suffer from pain, and at the end of a week a swelling appeared in the temporal region; the swelling and pain gradually increased in spite of local and general treatment. At the end of the second week the following condition was found:

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the whole of the left side of the face was swollen, and there was some œdema of the eyelids, the most prominent part of the swelling being over the posterior part of the zygoma, where the skin also was red. The boy complained of much pain, which prevented sleep; he was unable to open his mouth more than enough to swallow fluids, and any attempt to bite was very painful. The swelling was extremely tender, and there was slight tenderness over the mastoid process. The left tympanic membrane was dull and bulging, and the superior deep meatal wall was sagging; there was no pus in the meatus. The boy was deaf, whispered words being heard at 2 or 3 inches distance from the ear.

At operation, points of granulations were found throughout the mastoid, and on investigation of the outer attic wall some granulations were found, but in no part of the bone was pus actually discovered. The periosteum over the squamous part of the temporal fossa was stripped from the bone by a large collection of pus, and the muscle was softened by inflammation, and about one inch in front of the external auditory meatus there was a small superficial erosion of the bone just above the zygoma.

The swelling of the face did not disappear for a week, but eventually healing occurred satisfactorily; on the other hand, six weeks after the operation, the hearing had only slightly improved.

It was most unfortunate that the case was not operated upon sooner; the practitioner in charge had never seen a similar case, and so he did not associate the swelling with the early ear symptoms.

The absence of pus in the bone, notwithstanding a large subperiosteal abscess, is a point of some interest, though it is a feature of a certain number of cases of acute mastoiditis. Again, the cessation of otorrhœa may be noted, though it would not have prevented the diagnosis in view of the otoscopic findings.

CASE III.—Cyril J., aged 10, developed a left-sided acute otitis media; the membrane ruptured and otorrhœa continued for ten days. The temperature at first was raised to 102° F., but gradually fell until there was only a slight rise in the evenings. At this time there was some redness and bulging of the posterior superior quadrant of the membrane; after a few days of treatment with drops of *Glycerinum acidi carbolici* the membrane was freely incised. The boy now improved, the temperature fell to normal, and he was able to go out for walks; at the same time otorrhœa continued. Three days later, a swelling appeared in the temporal region; it gradually increased and became tender.

The picture was now typical of a temporal abscess consequent on zygomatic mastoiditis.

At operation, points of suppuration were found throughout the

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mastoid process and in cells in the outer attic wall. The subsequent history of the case was unsatisfactory; the meatus became very much narrowed as the result of having to separate the fibro-cartilaginous meatus from the bone in order to expose the outer attic wall thoroughly; a sinus persisted in the wound possibly as the result of the narrowed meatus. A further operation was required to deal with the meatus.

In spite of satisfactory removal of tonsils and adenoids eighteen months before, the patient developed acute otitis media. Though the original perforation was in the posterior superior quadrant, suppuration in the bone spread forwards. Separation of the soft part from the bony meatus is always a mistake on account of possible stenosis, and in these cases is very difficult to avoid, so that after zygomatic mastoiditis some stenosis is probable. (*Note*.—The boy subsequently developed right-sided acute otitis followed by zygomatic mastoiditis.)

CASE IV.—Ann B., aged 9, suffered from acute otitis and mastoiditis for which a simple mastoid operation was performed by Mr Butler of Guildford. The case made a good recovery, the wound healed perfectly, and the child's hearing improved to nearly normal. Fourteen days after the operation the child complained of some pain in front of the ear; this was not accompanied by any rise of temperature and passed off in three days. She was apparently well and returned home. Nine days later, or about four weeks after operation, the pain in front of the ear returned and the temperature rose to 100° F., and a slight swelling appeared over the root of the zygoma.

Examination by the writer at this time showed a slight swelling above the root of the zygoma; it was rounded and about 2 cm. in diameter; the root of the zygoma was tender, but the scar of the previous operation was soundly healed. The tympanic membrane was normal in appearance and the child heard whispered words at 9 feet. A diagnosis of residual zygomatic mastoiditis was made.

Mr Butler operated and reported that there was some pus in the temporal fossa and in one or two small cells in the outer attic wall; he dressed the wound with Bipp and closed it; recovery was uneventful.

This must be a most unusual case; at the original operation the outer attic region was investigated and gave no indication of special infection. The suggestion made is that there was an area of apparently healthy bone between the posterior part of the outer attic wall and the cells at the root of the zygoma. On the other hand, might this be a possible sequel to the use of Bipp and the immediate suture of the wound in a case of acute mastoiditis?



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CASE V.—A girl, aged 14, seen at Guy's Hospital, had had left-sided otorrhœa for three weeks; this had ceased and a swelling had appeared over the upper part of the mastoid process. She had pain for the most part above the ear, but also in front of the ear. She could not open her mouth to the full extent on account of a feeling of pressure in front of the ear. The left temporal fossa was distinctly full; the pinna was pushed forwards and downwards by a swelling which was tender and over which the skin was somewhat red; the tip of the mastoid was obscured.

There was in the meatus epithelial debris and the membrane could not be seen as the superior deep meatal wall was sagging. Operation showed pus in the mastoid process and a cell the size of half a pea full of pus in the outer attic wall and reaching forwards to the root of the zygoma.

This case might be called a combined case of mastoiditis and zygomatic mastoiditis, or, as Mouret has named it, para-mastoiditis.

These cases are examples of the condition of zygomatic mastoiditis, and they show that it presents a very definite clinical picture.

In Holmgren's paper some excellent photographs are published of patients showing the swollen face that is typical of the condition.

**Conclusions.**—1. Zygomatic mastoiditis gives a definite clinical picture.

2. To a great extent the affection arises on account of the anatomical condition of the squamous portion of the temporal bone.

3. Operation must always explore the outer attic wall to exclude extension forwards of disease.

4. There is some tendency to stenosis of the meatus after operation.

## THE RESULTS OBTAINED BY TONSILLECTOMY IN CERTAIN SYSTEMIC DISEASES.\*

By NOEL WHITTON, M.C., M.B., B.S., late Clinical Assistant,  
Ear and Throat Department, Royal Infirmary, Edinburgh.

THERE is no doubt that septic tonsils are sometimes an important source of focal infection in some systemic diseases, but there is no doubt also that their removal does not always bring about the cure of the disease for which the operation was undertaken. Possibly there is a tendency to attach too much importance to the tonsil as a focus of sepsis. Nevertheless, their removal is sometimes followed by a marked improvement in, or cure of the disease which they were suspected of causing.

The question arises, what systemic diseases can one reasonably hope to cure by taking out the diseased tonsils? This would, of course, be more easily answered if, at the same time, we could exclude other focal sources of infection, as pyorrhœa, etc.

I have collected a series of cases in which tonsillectomy has been done with a view to curing or relieving such diseases as rheumatism, chorea, etc. As the object was to ascertain the result some time after operation, cases covering a period of seven years have been selected for this purpose. Letters were sent asking the patients to report personally, or, if this was impossible, to write saying whether the operation had cured or improved their condition. The majority of the patients reported personally and I was able to examine them. The diseases enquired into were chorea, epilepsy, goitre, and rheumatism.

**Chorea.**—In his Hunterian Lecture, February 1915, Pybus said that nasopharyngeal lesions were present in 88 per cent. of children suffering from chorea. He contended that removal of the tonsils and adenoids is attended with considerable success in curing chorea, and he has shown that the tonsil is one of the chief sources of infection in this disease.

I was able to collect eleven cases. Of these, three are now altogether free from chorea. Two of these have been well since they had their tonsils and adenoids removed, but the third had attacks during the first two years following the tonsillectomy;

\* Reports for the year 1921, from the Ear and Throat Department, Royal Infirmary, Edinburgh, under the care of A. Logan Turner, M.D., F.R.C.S.E., F.R.S.E.

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these have now ceased. In eight of the eleven cases, chorea is still present though four of the eight have improved.

The following is a typical case:—

**CASE I.**—I. L., aged 14, under treatment for chorea, sent on 2nd May 1919 for examination of nose and throat. It was suggested by the physician that, if necessary, her tonsils and adenoids should be removed as a possible means of curing the chorea; 7th June 1919, tonsils and adenoids removed; 2nd February 1922, patient reported. She has had several attacks of chorea, and has been once in the Infirmary with it since removal of tonsils and adenoids. There is no history of rheumatism; no remnants of tonsils visible. Teeth are in good condition.

The number of cases is too small for any general deduction to be drawn, but the results are not very encouraging.

**Epilepsy.**—Six cases belong to this series. By careful inquiry into the history of the attacks, or by writing to the patient's doctor, I have concluded that all were cases of genuine epilepsy. Four of them are now entirely free from fits, while the other two have improved, the fits being less frequent and less severe. Five of the cases were under twelve years of age at the time of operation; the only adult in the series was not cured but was improved. The five children had their adenoids removed as well as their tonsils.

**CASE II.**—W. M'Q., aged 4½. First reported 27th April 1917. Patient has had four fits during the past two years. During the fits he is unconscious, froths at the mouth, and has incontinence of urine. 3rd May 1917, tonsils and adenoids removed; tonsils very large and septic. 24th February 1922, reported; much improved since removal of tonsils and adenoids. He had some fits after the operation, but has none now. His tonsils were not completely removed, but the remains look healthy. His brother is to have his tonsils and adenoids removed as he also has fits.

The number of cases here dealt with is too small to be of much use, although the results are interesting.

**Goitre.**—In 1914, Thiesen (*Annals of Otology, etc.*) reported six cases of acute thyroiditis following or accompanying tonsillitis. In all these cases the swelling subsided in a week or ten days; of those I have on record, the goitres were not acute but of long duration and roughly divided into simple and exophthalmic.

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There are fifteen cases: seven of simple goitre and eight with exophthalmic symptoms. All the cases are women. Of the simple goitres, one of the seven is now free from swelling in the neck, two are improved, although some swelling is still present, and four of the seven show no improvement. As a curative measure in simple goitre, tonsillectomy does not show good results. Of the eight cases of exophthalmic goitre, two are now well, two have improved, and four show no change. All had symptoms of Graves' disease in varying degrees of intensity. The two patients now free from symptoms were severe forms of the disease.

CASE III.—Miss M., aged 29. First reported 5th October 1920. She complains that solid food sticks in her throat. She is breathless and says that she is nervous. There has been swelling in the neck for fourteen months. On examination, tonsils distinctly enlarged, tonsillar glands palpable. Thyroid is rather large and hard, especially at the isthmus. There is slight exophthalmos. 6th October 1920, the physician reports that she had Graves' disease. 24th January 1921, both tonsils dissected out under local anæsthesia. 3rd March 1922, patient is much better; no breathlessness or nervousness; thyroid looks and feels normal. No exophthalmos. Tonsils have been completely removed. Teeth are in good condition.

Tonsillectomy may be adopted in what is sometimes called the "toxic" variety of exophthalmic goitre.

**Rheumatism.**—Here the results are more encouraging. All varieties of rheumatism were represented; acute, chronic, "muscular" and rheumatoid arthritis. Of the twenty-three cases, fourteen are now free from rheumatism, three are improved, while six show no improvement.

Of the fourteen cases now free from rheumatism, seven had had one or more attacks of acute rheumatism, while the other seven were chronic articular cases. In three of the latter the joint trouble cleared up within a month of the tonsillectomy.

The three that showed improvement only had all been cases of rheumatic fever. They had had no recurrence of acute symptoms, but still complained of rheumatic pains in wet weather.

Of the six unimproved cases, two were examples of rheumatoid arthritis. They were both advanced cases, having marked bony changes in the joints. The other four unimproved cases were examples of chronic rheumatism—two of the "muscular" variety.

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CASE IV.—D. R., aged 42. First reported 19th February 1921. Patient has subacute rheumatism in his ankles and shoulders, and the physician thinks he should have his right tonsil removed. He has not had any tonsillitis. Both tonsils are enlarged, especially the right. The crypts of the right tonsil are discharging slightly. 3rd March 1921, tonsils dissected out. 20th March 1922, patient reported. He has been free from rheumatism since the removal of his tonsils. Teeth are bad.

One case was interesting in that a condition of flat-foot complicated the rheumatism. The flat-foot was cured at the same time as the rheumatism. I think this is explainable by the toning up of muscles and ligaments consequent on using the foot freely again.

Hill Hastings (*Annals of Otology, etc.*, December 1921), working on the same subject, had 40 per cent. cured of rheumatism, 39 per cent. improved, and 21 per cent. unimproved. He did not operate in advanced cases of rheumatoid arthritis, and, of course, when there are bony changes in the joints, tonsillectomy as a cure must be hopeless. He had 104 cases and only seven gave a history of acute tonsillitis before the onset of rheumatism.

Layman (*Laryngoscope*, February 1918) sent a questionnaire to laryngologists and internists requesting information regarding the results obtained by tonsillar enucleation in cases of arthritic, cardiac, renal, and other systemic diseases. The reports include 894 cases. The results were as follows:—Arthritis, 68 per cent. of cures; Cardio-vascular, 36 per cent.; Renal, 81 per cent. One has the impression that these percentages are too high. But there is no doubt that removal of diseased tonsils is worth while as a possible cure for rheumatism.

The following is a table of my results:—

Disease.	Number of Cases Operated on.	Cured.	Improved.	Not Improved.
Chorea . . . .	11	3	4	4
Epilepsy . . . .	6	4	2	0
Simple Goitre . . . .	7	1	2	4
Exophthalmic goitre . . . .	8	2	2	4
Rheumatism. . . .	23	14	3	6

I am much indebted to Drs Logan Turner and J. S. Fraser for kind permission to publish the above results.

## CONGENITAL BILATERAL OCCLUSION OF THE CHOANÆ.\*

By A. J. M. WRIGHT, M.B., F.R.C.S., Lecturer in Laryngology, Rhinology, and Otology, University of Bristol; Surgeon to the Throat and Nose Department, Bristol General Hospital; Hon. Rhinologist, Bristol Eye Hospital.

THIS somewhat rare congenital abnormality is of interest both from the difficulties which it presents in diagnosis and treatment, and from the light it throws on the causation of those skeletal changes which we associate with the mouth breather. I have had under my care two cases of this condition occurring in sisters. The occurrence of congenital choanal occlusion in two members of a family, as far as I can ascertain, has not been previously recorded.

In November 1919, a girl, aged 14, was brought to me by her mother with the complaint that her nose was stuffy, and with the request that I would remove the child's adenoids. The fact that the mother stated that the adenoids had been removed twice before, and also that on examination it was found that the nasal obstruction was absolute, led to further investigation. On making inquiry into the family history, the mother volunteered that she had another daughter, one year older, who also was unable to breathe through her nose. Three other children, aged 12, 8, and 6 respectively, could all breathe normally.

The detailed history of the two cases was as follows:—

In both patients the breathing was very noisy at birth and great difficulty was experienced in feeding them. There was, however, in neither case any tendency to asphyxia at birth. During infancy the breathing was very noisy, leading the father to christen them "his two little steam-engines." From the age of about two years the respiration became quiet, both during sleep and when awake. The children were taken to doctors on several occasions because of the nasal obstruction, and alleged "adenoids" were removed from the one child on two, and from the other on three occasions, without any benefit. Their health, in other respects, had always been good.

On examination it was noted that both children were well developed and intelligent. The chest showed no deformity, the palate was rather

\* Paper read at the Section of Laryngology, British Medical Association, Glasgow, July 1922.

## Congenital Bilateral Occlusion of Choanæ

high. The nasal cavities were full of mucus. When this had been removed it was seen that the passages were wide and the septum straight. The turbinals were small and presented a curious collapsed and crenated appearance. The nasal obstruction was absolute, and in neither case was there any sense of smell. Posterior rhinoscopy was unsuccessful, but on palpation both choanæ were found to be closed by a smooth, hard plate with a slight dimple in the middle. The ears of one patient were normal, but the other showed, on one side, a perforation with a little purulent discharge. This had been present for several years.

The two cases were operated upon, on the same day. The plate which was found to be entirely bony, was removed with mallet and chisel, and, in addition, about half an inch of the posterior end of the nasal septum. When seen now, two years later, both have a free airway on each side and are apparently breathing constantly through the nose. One has developed some slight sensation of smell, the other has not. Both continue to have free discharge of mucus from the nose, but they now blow it out instead of wiping it away when it overflows, as they had previously to do. The turbinals still appear collapsed and crenated. The ear which had been discharging is apparently dry, but still shows a small inferior perforation.

Points of interest which occur to me in these two cases, and which bear upon the symptomatology and treatment, are:—

1. The occurrence of the condition in two members of one family.
2. The absence of asphyxia at birth.
3. The difficulty in diagnosis at an early age owing to the small size of the parts involved. Thus, both were regarded as cases of adenoids for many years, and altogether five operations were performed for the removal of this condition. I suggest that the existence of a *complete* obstruction of the airway on one or both sides of the nose in an infant is never due to adenoids.
4. The absence of any sense of smell was to be expected but its partial recovery after operation, in one of the cases, is of interest and might be regarded perhaps in the same light as the recovery of vision as a result of use in an amblyopic eye.
5. The return to, at any rate, a considerable degree of nose breathing after the removal of the obstruction is rather surprising.
6. After examining the literature it would seem probable that cases of syphilitic stenosis are not infrequently confused with this congenital condition. The characteristics of the occluding septum should prevent this error.

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The removal of the posterior portion of the nasal septum in addition to the occluding bone seems to render the operation effective. In the only other case which I have had to treat, and in which this was not done, the opening contracted in spite of attempts to keep it opened by dilators. None were employed in these children.

I wish to consider briefly the bearing that these cases present on the causation of the secondary changes observed in a case of neglected adenoids. The factors which would seem to be at work, in a case of adenoids, are :—

- (a) Respiration partially through an obstructed nose and partially through the mouth.
- (b) Infection of the nasal and naso-pharyngeal tissues.

In congenital occlusion, on the other hand, the factors are :—

- (a) Entire mouth breathing and absence of nasal breathing.
- (b) The absence of infection.

The case of neglected adenoids presents chest deformity, narrow and highly-arched palate with crowded and carious teeth, collapsed alæ, narrow nasal passages, with deflected septum and enlarged turbinals. The ears present evidence of infection. The choanal occlusion has no chest deformity, only a moderate degree of elevation of the palate, sound teeth, practically normal development of the alæ and nasal passages, with a straight septum and collapsed turbinals. It would seem, therefore, that pure mouth breathing does produce some degree of narrowing and arching of the palate, but that chest deformity, narrowing of the nose, collapse of the alæ, deflection of the septum, and changes in the ears, are the result of respiration through a partially obstructed passage, or of infection, or of both. Inspiration through an obstructed airway would seem alone to account for deformities in the chest, while a combination of these two factors probably accounts for the mal-development of the nasal passages and enlargement of the turbinals. The causation of the septal deflection seems difficult to explain. In the cases of the more common variety of unilateral choanal occlusion, the septum in the majority is not deflected.

I think it possible that the deflected septum in some cases of neglected adenoids really represents what one might describe as the normal degree of deformity, but it attracts



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attention and requires treatment because it exists in nasal passages which are already extremely narrow. The condition of the turbinals in cases of choanal occlusion is curious. They seem to be uniformly small and collapsed, and I suggest that either the stimulus of nasal respiration is necessary for the full development of the cavernous tissues, or that possibly the congenital defect leads to an associated abnormality in the blood supply, with a resulting ill-development.

Thus, apparently absolute nasal obstruction with complete mouth breathing is less detrimental to the child than partially obstructed nasal breathing. This might furnish an argument against the treatment of nasal obstruction in children by breathing exercises without previous removal of the obstruction.

I may say, in conclusion, that the conditions found in these two cases are in substantial agreement with those described in other reported cases.

## A CASE OF BIFID NOSE.

By GEORGE WILKINSON, F.R.C.S., Sheffield.

THE class of facial deformity which depends on failure of union of the *two mesial nasal processes* is rare, much rarer than that due to failure of union between the mesial and lateral nasal processes. To the latter class belong the usual type of hare-lip and cleft palate.

The median portion of the face is developed from two pairs of facial processes, the lateral, and the mesial, which enclose the olfactory pits. These are vertical septa growing from the base of the primitive cranium. The parts seen on the face are the anterior extremities of these septa. The two median processes are fused above in the area known as the nasal field, and have two globular enlargements below as tips. From the mesial processes are developed, the nasal septum, the columella, the mid portion (lunula) of the lip, and the premaxillæ. These processes may fail to unite in the second month (see Figs. 2, 3, and 4).

True median hare-lip is the best known deformity which may result. Other deformities referable to the same cause are median cleft palate, bifid nose, and median dermoid cysts or fistulæ of the ridge of the nose. These latter are due to epithelial remnants enclosed in the process of fusion, and are not uncommon. The writer has seen and operated upon a fair number. In the case of fistulæ, the opening on to the skin is at the lowest part of the fistula, the track of which runs upwards. The writer has also seen a case of central hairy mole on the ridge of the nose, the long axis of which was directed upwards, which he considers to have been due to a modification of the skin at the line of fusion of the mesial nasal processes. Hairy moles of similar origin are not infrequent in the middle line of the back just above the sacrum (spina-bifida area).

The patient who is the subject of this communication is a boy aged 12. He was first seen by the writer at the Sheffield Royal Hospital when he was eight months old. The case was reported at a meeting of the Section of Laryngology, Royal Society of Medicine, in February 1910.\* There is a photo-

\* *Journal of Laryngology*, 1910, p. 131.



FIG. 1.—Aged 8 months.



FIG. 5.—Aged 11 years. Before Operation.



FIG. 6.—Aged 12 years. After Operation.



# A Case of Bifid Nose

graph of the baby in Sir St Clair Thomson's well-known text-book,\* which is reproduced in Fig. 1.

The deformity consisted of a deep depression in the middle line of the nose, with wide separation of the nostrils and flattening and broadening of the whole feature. The nose was 3 cm. wide at the level of the alæ, but only projected about 1 cm., the greatest projection being on either side of the middle

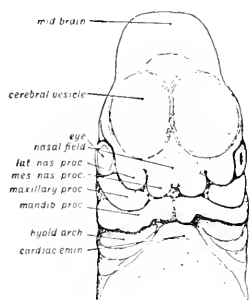


FIG. 2.†—Showing the formation of the Face by the Nasal, Maxillary and Mandibular Processes in an Embryo of the fourth week. (After His.)

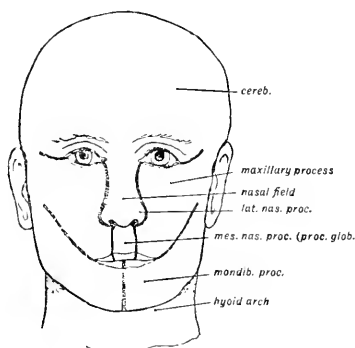


FIG. 3.†—Showing the parts of the Face formed from the Nasal, Maxillary, and Mandibular Processes.

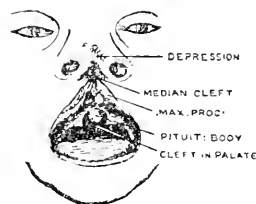


FIG. 4.†—Median Hare-Lip in a Child with Partial Cleft Palate and Ectopia of the Pituitary. (Mr A. R. Tweedie's case.)

line in front of each nostril. These two prominences were separated by a depression of the tip of the nose 2 cm. wide. The nasal bones and nasal processes of the superior maxillæ were flattened. The columella was 2 cm. broad, and the anterior nasal spine could be felt behind the columella as a broad projection of bone, about 1.5 cm. from side to side. On inspection

\* *Diseases of the Nose and Throat*, Sir St Clair Thomson, p. 4.

† Reproduced from Keith's "Human Embryology and Morphology," pp. 140 and 142, by kind permission of Sir Arthur Keith and Mr A. R. Tweedie.

## George Wilkinson

of the nasal passages, the anterior ends of the nasal septum could be seen as a prominent ridge on the inner side of each vestibule. The two sides of the septum were evidently separated from each other. There was no nasal obstruction. On everting the upper lip a distinct notch on the buccal surface, in the very centre of the lip, could be seen (slight condition of median hare-lip). There was also a well-marked notch in the middle line of the alveolar process (slight condition of median cleft palate). The two halves of the alveolus were not in alignment, but met with a forward projecting angle.

The question of operation was considered, but did not seem advisable to the writer, as he foresaw that any attempt to bring the two separated halves of the nose together would reduce the nostrils to almost horizontal slits and would render nasal breathing impossible. It was decided to wait until the growth in size of the organ had given it sufficient forward projection to obviate this danger.

The boy was brought up again to the hospital in December 1920, being then 11 years old, when the photograph reproduced in Fig. 5 was taken. The separation of the tips of the alar cartilages with the deep depression between and above them, and broadening of the feature across the bridge made a very noticeable deformity. The boy and his parents were anxious to have something done to correct it.

**First Operation, 15th December 1920.**—The nose was split by an incision in the middle line extending from the forehead to the base of the columella, and the skin was dissected back from the underlying cartilage in two flaps. The depressed area above the tips of the alar cartilage was found to be floored by cartilage (the united lateral cartilages) stretching across from side to side, but there was only soft connective tissue between the projecting apices of the vestibular cartilages. This was dissected away. The splayed anterior ends of the separated halves of the septal cartilage were dissected submucously out of each vestibule. The broad buttresses of bone forming the anterior nasal spine were chiselled away. It was found to be separated mesially into two halves.

Both nasal bones were removed subcutaneously, and sufficient cartilage was cut away from the lateral cartilages on either side of the septum to allow the sides of the nose to be approximated. The alar cartilages and the remains of the lateral cartilages were then sutured together with catgut, so as to

## A Case of Bifid Nose

approximate the two halves of the nose. The projecting tips of the alar cartilages could not be approximated as much as one would have wished, on account of the undue narrowing of the nostrils which would have resulted. The skin incision was sutured accurately.

**Second Operation, 21st November 1921.**—Cartilage for implantation was obtained by partial resection of the seventh right costal cartilage.

The skin over the nose was again incised through the lower half of the former scar. One flat blade of cartilage was inserted into the columella as a prop to support the second spar of cartilage which was inserted to form the ridge of the nose, and a lobule of subcutaneous fat from the chest wound was tucked in to make a fresh tip to the nose, and to conceal the outlines of the cartilage supports. The skin was sutured over all. The wound after both operations ran an aseptic course. The after-treatment consisted in painting the skin of the nose with picric acid solution, and keeping it covered by the writer's perforated metal nasal shield.\*

The two central incisor teeth, which were directed horizontally inwards overlapping one another, were removed.

The result is shown in the photograph, Fig. 6. It is by no means a perfect result. The approximation of the alar cartilages is not so close as one would wish, but it is as close as one could get it, having due regard to the patency of the nostrils, and taking into consideration the intractable resiliency of the cartilage tending to bring it back to its former position. The tension of the skin of the tip of the nose, which was considerably stretched by being propped up by the inserted cartilages, has somewhat flattened the lobule of fat inserted into it at the second operation. It is undeniably a snub nose, but not such a feature as to immediately draw the attention of passers-by. As compared with the condition before operation, it is a distinct improvement.

\* See *Journal of Laryngology*, 1919, p. 2.

# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF LARYNGOLOGY

*President*—Sir WILLIAM MILLIGAN, M.D.

June 30th, 1922.

**Epidiascopic Demonstration of a Method of Transillumination of the Tonsil *in situ***—IRWIN MOORE, M.Ch.—This method—introduced by Dr Thomas French, of Brooklyn—by means of which in conjunction with the tonsilloscope (a tonsil microscope) the tonsil of health may be differentiated from that of disease, was brought to the notice of the Section with a view to investigations being made by members as to its practicability and efficiency.

**Instrument for Electrolysis of Tonsils requiring Removal**—Dr A. R. FRIEL.—(Published in *Lancet*, 20th August 1921, p. 417.)

**Portion of Left Styloid Process**—Mr A. J. M. WRIGHT, F.R.C.S.—Bone removed from left tonsillar region of female, aged 30. The symptom was discomfort in the left side of the throat, particularly on swallowing, noticed for a few weeks only.

Mr WRIGHT said that he exhibited the specimen because he had had to deal with two cases in the last six months in which such a condition gave rise to symptoms. Sir St Clair Thomson had, in his text-book, stated that though it was an anatomical curiosity, symptoms were never caused by it. But he (Mr Wright) found that a considerable number of cases had been recorded in which symptoms occurred, and that they had been entirely relieved by removal of the projecting process. A skiagram in this case did not help the diagnosis.

**Three Cases of Epithelioma of Palate and Fauces treated with the Diathermic Cautery**—Mr WALTER HOWARTH, F.R.C.S.

I. *Epithelioma of Soft Palate and Tonsil*.—Male, aged 45, had a shallow ulcerated growth on upper pole of left tonsil spreading across soft palate. The whole of the soft palate, including both tonsils, was excised in one piece ten weeks ago. The glands of the neck on both sides were to have been removed, but the operation has had to be postponed for a week or two.

II. *Epithelioma of Palate, Tonsil, Tongue, and Floor of Mouth*.—Male, aged 56, sent with a so-called inoperable growth. This was found to extend in the base of the tongue almost to the epiglottis. The mass removed includes the whole of the growth and the posterior two-thirds of the base of the tongue. Glands of the neck



# Royal Society of Medicine

were considerably involved and were dealt with at a subsequent operation.

III.—*Epithelioma of Palate removed by the Knife: Recurrence in Palate, and Lateral Wall of Pharynx excised by the Diathermic Cautery.*—Male, aged 44. First seen, June 1917, with an epithelioma of palate. This was excised in the usual way and a block dissection of the glands performed on a subsequent occasion. In October 1918, signs of recurrence appeared. Owing to a misunderstanding the patient did not come into hospital, and when seen again in January 1919, there was an extensive recurrence in the palate and on the right lateral wall of the pharynx and nasopharynx. This was excised by the diathermic cautery. There has not been any recurrence during the past three and a half years.

The cases are exhibited (1) to show the result when the method is used in an early case; (2) to show the result in a so-called hopelessly inoperable case; (3) to show a typical end-result. This case also serves to emphasise the author's contention that in all cases of malignant disease of the mouth and pharynx the growths should be removed by the diathermic cautery in preference to the knife.

Sir WILLIAM MILLIGAN (President) said the cases and specimens exhibited demonstrated what could be done with the diathermy knife. Mr Howarth's results were excellent and he had been able to make a clean sweep of the disease. The conclusions at which Mr Howarth had arrived might well be sifted and discussed by members of the Section. He (Sir William) had always maintained that there was a great field for diathermy in disease of the mouth and fauces. In many cases which were adjudged inoperable with the knife by general surgeons, much good could be effected by diathermy. He had patients who were living in complete comfort whose cases had been declared by surgeons to be inoperable and these he had treated by diathermy.

Mr W. STUART-LOW said his experience of diathermy coincided with that of Mr Howarth. He had had a number of cases which he had successfully treated by diathermy, some of which he had exhibited before the Section.

Mr G. W. DAWSON inquired how Mr Howarth dealt with the growth when in close proximity to the carotid. He could understand the procedure in cases in which large portions of the tongue had to be dealt with, where there were no large vessels.

Dr W. H. KELSON inquired whether the cases now shown were fair samples of Mr Howarth's results, and whether he had any failures or secondary hæmorrhages? In the early days of this treatment one heard of cases in which sudden death followed.

Mr W. H. JEWELL said he had had one case of collapse and death six hours after operation by diathermy without the patient having regained consciousness. He had an extensive epithelioma of the lateral wall of the

## Societies' Proceedings

pharynx and fauces, and the diathermic cautery was applied superficially to relieve his pain. The patient could only breathe with his head flexed and he was much congested. It was necessary to perform artificial respiration twice during the operation, so that it is questionable whether the diathermy was directly the cause of his death.

Mr A. J. M. WRIGHT agreed with Mr Howarth's conclusions and said that the method represented a great advance and rendered operable some cases which previously were inoperable; it caused less constitutional disturbance than did ordinary operations. Diathermy had some disadvantages, but these were outweighed by the advantages.

Mr H. V. FORSTER said these cases renewed the encouragement they had received from the President's paper on this subject at Liverpool,\* and before this Section.† He asked whether Mr Howarth had treated by this means any cases of epithelioma of the pyriform fossa. He (the speaker) had seen several cases in which the disease extended down the lateral wall of the pharynx, and he did not feel encouraged to use diathermy so near the larynx. Cases of mouth and throat cancer, as elsewhere, varied in the degree of malignancy; some cases did well; the wound healed and the patients increased in weight. He had one case rather wasted, in which a growth of the fauces on the left side involved the upper and lower jaws. Following cauterisation the wound healed and patient increased two stones in weight. Although at the operation the glands were dissected out, there was now recurrence in the neck. What was Mr Howarth's experience with regard to hæmorrhage? At the Liverpool Hospital they had been very fortunate in that respect, for they had not had a severe case of secondary hæmorrhage. In some cases the external carotid was previously tied, in others not.

Mr NORMAN PATTERSON agreed with Mr Howarth's conclusions to which he (the speaker) had come some years ago—as to the advantage of diathermy over cutting operations in the mouth and pharynx, whether the condition was early or advanced. He strongly emphasised the necessity for dealing with glands in the neck; they should be thoroughly removed by block dissection either before or after the diathermy operation. Three years ago he had had a male patient, with a small growth involving the palate and uvula, who refused any operation on his neck. Patient did well for three years. There was now an inoperable recurrence in the neck. Again, he had seen another case, in June 1919, of a small growth on the left tonsil. An operation on the neck was refused, and diathermy was carried out. Three months later patient had a large mass in the anterior triangle, and, after much pressure, submitted to an operation. He (Mr Patterson) dissected out all the glands from the anterior triangle, and sections examined showed typical epithelioma. Three months later the patient had a recurrence in the posterior triangle, and this was removed. Two months ago no sign of disease could be found.

Sir WILLIAM MILLIGAN (President) said that secondary hæmorrhage was probably an exaggerated danger in these cases. If one happened to be operating very close to a large vessel, one would probably ligature the

\* *Brit. Med. Journ.*, 1921, i. p. 461.

† *Journ. Laryng. and Otol.*, August 1921, p. 369.

# Royal Society of Medicine

vessel. But his own experience was that secondary hæmorrhage was comparatively rare. In one case he had been obliged to ligature the lingual artery.

Mr HOWARTH (in reply) said he exhibited the cases to show three typical varieties ; they were not carefully selected to show good results, but illustrated the result obtained in each type. With regard to secondary hæmorrhage, he did not think the seat of operation was sufficiently near the carotid to cause anxiety ; the arteries one encountered were those in the pharyngeal wall ; the ascending pharyngeal and branches of the lingual artery, and, in the tongue cases, the lingual artery itself in the floor of the mouth. The diathermic spark would not coagulate the lingual artery, but if that artery was efficiently tied it did not cause any further trouble. He had never had secondary hæmorrhage of any kind in these pharyngeal, tonsillar, and palate cases, and he did not see any reason why it should occur, as the vessels in those regions were not large ones. One should certainly not go near the carotid artery. In answer to Dr Kelson, he had not had any case of sudden death, and he found patients stood this operation remarkably well, and had very little shock. Chloroform was the anæsthetic of choice ; ether could not be employed because of the danger of the spark igniting it. There was practically no pain from these operations in the mouth, a striking contrast to the severe pain on burning a cutaneous surface. The cases healed up under a dirty-looking slough, which cleared up in about ten days, leaving a smooth granulating surface, which quickly became a very elastic scar. He had used a modification of the method in many hopeless cases in which one could not expect to remove the growth. In these he removed what he could, and tried to destroy as much as possible of the rest by buzzing the spark into the growth, and even in those cases there had been gratifying results, in the relief of pain and the clearing up of sepsis. In answer to Mr Forster, he had used it in hopelessly inoperable cases in the pyriform fossa, and he did this through the ordinary tube spatula, with a special electrode, which passed easily down the tube. He always performed a preliminary tracheotomy, because œdema in the region of the arytenoid often followed. In these cases, of course, the treatment was only palliative. Last year he had had two cases in which the growth was removable ; he approached the growth by transthyroid pharyngotomy, after the method of Trotter, but instead of removing the growth with the knife, he used the diathermic cautery. He removed the growth satisfactorily, but the result was not a success in either case. The first patient was very intolerant of the nasal feeding tube, and pulled it out on the seventh day, with the result that he died from septic broncho-pneumonia. The other patient progressed well for three days ; had no shock, seemed well and comfortable, but died suddenly without any warning from uræmia. In his next operable case, which he could approach through the wall of the pharynx, he would again excise with the diathermic cautery. He agreed with everything Mr Patterson said about removal of the glands in these cases, which he regarded as very important. A complete dissection of the triangles of the neck should be undertaken as soon as possible ; the difficulty was to persuade patients to agree when there were no noticeable swellings in the neck. In a previous discussion some objection had

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been raised to the weight of the cautery apparatus hampering the movements of the operator. He used a home-made instrument (which he exhibited). This consisted of a platinum wire in a glass tube, with an insulation of vulcanite and rubber; it was quite light, and could be used for an hour or more without discomfort.

**Epithelioma of the Right Half of the Fauces treated by Diathermy (with Section).**—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—Wm. E., a middle-aged man, with epithelioma of the pharynx; he had had discomfort in the throat for two years, and pain, with inability to swallow solids, for six weeks; there was dense infiltration of the anterior pillar extending along the velum palati nearly to the uvula; in the centre of this there was a mushroom-shaped outgrowth which extended down to the ascending ramus of the lower jaw. With a diathermic knife the growth was excised as far as possible, and the portion adherent to the lower jaw was diathermised by means of the button rheophore. The reaction was extremely slight, the pain disappeared, and the patient was able to swallow with comfort in about two days.

Sir WILLIAM MILLIGAN (President) asked whether the appearance on the right side of the lower jaw was malignant or inflammatory.

Mr NORMAN PATTERSON thought the appearance referred to by the President was a recurrence; he himself had had cases like that. The proper course was to remove a piece, have it examined, and, if malignant, diathermise again. It was not always easy to tell whether one was dealing with granulations round a sequestrum or with a recurrence of the growth.

Dr DONELAN asked whether Mr Howarth or Mr Patterson had had any ill results or inconvenience from the use of chloroform.

Sir JAMES DUNDAS-GRANT (in reply) said he had removed a portion of the granulating part, which evidently led down to necrosing bone; the tissue proved to be carcinomatous.

Mr HOWARTH replied that he had had no ill effects from the use of chloroform in these cases. Occasionally when oxygen as well as chloroform was used, there was a minute explosion, and he had noted a smell of chlorine in the mouth.

**Tuberculous Ulceration of the Gum of the Lower Jaw, of the Tip of the Tongue, and previously of the Sublingual Tissues**—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—Male, aged 47, first seen in September 1918, complaining of difficulty in talking and swallowing. There was extensive tuberculous ulceration of the sublingual tissues. He had previously been under X-ray treatment at a general hospital for two years, and at the end of this time was given three months to live. He then came to the Throat Department of Brompton Hospital, and after prolonged treatment by the galvano-cautery, and applications of pyoktanin and Lake's compound formalin solution, the tuberculous ulcers in the floor of the mouth healed.

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He remained free from the trouble till May 1921, when he was again referred to me on account of tuberculous ulceration of the tip of the tongue, a portion of which was excised; the persistent small spots are now being treated by the galvano-cautery; very recently there has been an extending ulceration of the gums at the site of the lower central incisors; this is being subjected to the same treatment and to local applications of pyoktanin and iodoform.

In 1921, Dr Fenton reported that the patient had extensive but very chronic pulmonary tuberculosis, mainly in the right lung (tubercle bacilli present in sputum), and that he had recently developed a small tubercular abscess over the lower costal cartilage on the right side, which had diminished after aspiration.

Sir JAMES DUNDAS-GRANT said he proposed to continue treatment, chiefly by galvano-cautery, for the penetrating tuberculous ulcer in the gum and alveolar process. The prognosis of tuberculosis in the mouth was so bad that the mastery obtained over the ulcerations on the tongue was almost more than one could have expected.

**Case of Tuberculosis of the Larynx treated mainly by Transnasal Inhalations into the Larynx**—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—In March 1921, the patient, a young lady, aged 21, had complete loss of voice, with subcordal infiltration and a serrated deposit in the interarytænoid space: there was a good deal of expectoration, and tubercle bacilli were found in the sputum. There was also such extreme enlargement of the lingual tonsil that it was advisable to remove a portion; this was done with the galvano-caustic puncture to make it less vascular and then with the lingual tonsillotome; her voice recovered to an extraordinary degree, though she was not allowed to use it.

Applications of lactic acid and Lake's formalin compound solution to the subcordal swelling were made at long intervals, and more recently, injections of argyrol and collosol argentum into the larynx. The main treatment, however, consisted in the daily inhalation through the nose into the larynx of one part of eucalyptol in nineteen of oil of sweet almonds to which was added later a little iodol and menthol.

The voice has now returned, there is no cough, and the little sputum obtained from her in May of this year contained no bacilli, the larynx being practically normal.

Sir JAMES DUNDAS-GRANT said the transnasal inhalation or injection seemed to have a very beneficial effect. The patient could administer it herself. The injections were made through the nose while the patient's head was thrown back, and breathing was carried on with the mouth open though without swallowing.

**Case Illustrating very Rapid Advance of Laryngeal Cancer**—Mr ARCHER RYLAND, F.R.C.S.Ed.—Male, aged 47. The

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history is one of only eight weeks. Although the precise origin of the growth cannot be stated, it is certain that the cancer has an extrinsic origin. The voice is only affected by the bulky presence of a large mass of growth above the cords. The neoplasm rises high up towards the upper pharynx, and from here a piece was very easily snared for the purpose of microscopical section.

The case is shown for its short history, and its very active and malignant character.

Sir WILLIAM MILLIGAN (President) said he did not suppose much could be done in that case except by symptomatic treatment, including insufflations of charcoal, to absorb the bad odours, which were quite noticeable in this patient.

## ABSTRACTS

### EAR.

*The Diagnosis and Treatment of Empyema of the Mastoid Cells occurring during Acute Middle Ear Suppuration.* SCHEIBE, Erlangen. (*Munch. Med. Wochen.*, Nr. 10, Jahr. 69.)

In this article, which is written for the guidance of the general practitioner, the author states that mastoid empyemata occur more often in cases of genuine middle ear suppuration than in those which are of secondary origin. Empyema is found to be three times more frequent in the male sex. This is attributed to the more strenuous bodily and mental exertions of the male, to alcohol, and perhaps also to the greater development of the mastoid process in this sex.

The type of bacterial infection does not appear to play a predominant rôle, though attention is drawn to the relatively greater frequency with which the streptococcus mucosus is found in cases of empyema. Swelling and tenderness to pressure are, when present, valuable aids to diagnosis, but both may be absent in the more dangerous and deeply seated latent empyemata. The temperature may, in these cases, be normal or only slightly elevated even in children; the hearing may have almost returned to the normal, and it should be noted that the suppuration of itself does not excite pain. An important indication in such latent or doubtful cases is the duration of the suppuration. In the genuine forms it should always excite suspicion if the suppuration has existed for more than two weeks. Another important point is, that so long as an empyema exists in even a single cell the appearance of the tympanic membrane makes no progress towards a return to the normal. The writer lays stress on

# Ear

the continuation in such latent cases of the disturbing throbbing in the head which is rather heard than felt by the patient. This pulsation, which is synchronous with the pulse, may only be elicited by questioning the patient; it is invariably present, and is intensified when the head is lowered, after taking alcohol, or after a full meal. The ear discharge is characterised by its excessive quantity and by its creamy consistence. It must, however, be remembered that an ear discharge is not a necessary accompaniment of mastoid empyema.

The conservative treatment adopted consists in the thorough cleansing of the ear, the insufflation of boric acid and the air douche. An ice bag is applied to the mastoid process, the strictest bodily and mental rest is enjoined, and the head is kept high.

If, in spite of this treatment, any or all of the symptoms increase in severity, or there is even a slight rise of temperature, a mastoid operation is performed. Swelling and tenderness are always to be looked upon as definite indications for operative intervention. It is necessary in doubtful cases to make a daily minute investigation of the patient's symptoms.

Whilst admitting that the operation is usually simple and devoid of risk, the writer points out that the anatomical conditions prevailing and the situation of the empyema may render its detection and evacuation a matter of difficulty or impossibility even in the hands of an expert.

The author holds that the mortality in cases treated early amounts at the highest to 1 per cent.

JAMES B. HORGAN.

*Bilateral Mastoid Operation in Cases of Bilateral Acute Middle Ear Suppuration.* HOLGER MYGIND. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 to 2. Stockholm, 1921.)

The material referred to consisted of 909 operations performed on 817 patients, the operation being bilateral in 92 of these. In addition, there were 65 other patients, where, though the middle ear suppuration was bilateral, the operation was only performed on one side.

In investigating this material, Professor Mygind arrived at the following conclusions:—

In the course of a bilateral acute middle ear suppuration, children, far more than adults, are liable to develop a mastoiditis; children, however, do not develop bilateral mastoiditis more often than adults.

In more than half the total number of patients who were operated upon on both sides, there was no mastoid swelling, and yet pus was found at the operation in all cases except one.

The most important result of the present investigation seems to be the conclusion that when in cases of acute bilateral middle ear

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suppuration there is an indication for operating on one side, an operation ought as a rule to be performed on the other side as well, even if there are no mastoid changes there, *unless* a decrease of the suppuration or a clearing up of the otoscopic conditions, possibly in connection with an improved hearing, shows that the affection on this side is on its way to recovery. AUTHOR'S ABSTRACT.

*Secondary Suture after Simple Mastoid Operation.* HOLGER MYGIND.  
(*Acta Oto-Laryngologica*, Vol. iii., fasc. 1 to 2. Stockholm, 1921.)

Mygind's method, which consists in filling the wound cavity in the mastoid process with a blood-clot ten to twelve days after the operation, and afterwards suturing the skin, has now been carried out in the Kommune Hospital in 313 cases.

The oldest patient who recovered *per primam* was 81 years of age, the youngest 2 months old.

In 81 per cent. of the cases there followed recovery *per primam*, though in some of these there was a rupture of the epidermis or small focal suppurations round Michel's clips, which were always used. In 19 per cent. the clot broke down and suppurated.

The most frequent reason for the suppuration was a fresh outburst of the primary acute middle ear suppuration; and the cases where in the primary operation streptococci had been found, were more apt to fail than those with other kinds of bacteria.

AUTHOR'S ABSTRACT.

*Fistula of the Parotid Gland after Mastoid Operation.* A. BINNERTS.  
(*Acta Oto-Laryngologica*, Vol. iii., fasc. 4.)

The Author adds a case of this condition to the very few which have been recorded. It occurs only if (1) the parotid gland is abnormally large, physiologically or pathologically; (2) the operation wound is deep and well forward; and (3) a large duct of the gland is injured. The fistula may be closed by cauterisation with Silver Nitrate, injection of Tincture of Iodine, or failing this by excision.

THOMAS GUTHRIE.

*Affections of the Middle-Ear in Lupus Vulgaris.* AAGE PLUM.  
(*Acta Oto-Laryngologica*, Vol. iv., fasc. 1.)

The Author examined at the Institut Photothérapique de Finsen in Copenhagen the ears of 278 patients under treatment for lupus. 28.4 per cent. of the ears were normal, 36.7 per cent. showed slight catarrhal changes, 4.5 per cent. acute and 8.1 per cent. chronic suppurative otitis media, 9.8 per cent. residua of chronic suppurative otitis media, 9.7 per cent. chronic middle-ear catarrh and 2.5 per cent. nerve deafness.



## Ear

Among those with normal ears there was a slight preponderance of patients with skin affection only, while acute suppurative otitis media and chronic middle-ear catarrh were found twice as often in cases with lupus of the mucous membranes as they were in those with skin disease alone. Similarly among cases with chronic suppurative otitis media and its residua there was a relatively considerable majority of patients with lupus of the mucous membranes. In only three of the cases of chronic suppurative otitis media was the disease certainly tuberculous.

THOMAS GUTHRIE.

*Zinc Ionization as a Disinfectant in Local Sepsis illustrated by its Use in Chronic Otorrhœa in Children.* A. R. FRIEL. (*Brit. Med. Journ.*, 8th July 1922.)

Suitable cases for the Ionization treatment are said to be those in which "the sepsis is confined to the Tympanum and does not involve the Attic or Mastoid, and the perforation of the drum is large enough to allow fluid such as Zinc solution to enter the ear."

Polypi must be removed if present, and adenoids, rhinitis, sinusitis, or pyorrhœa should be attended to.

Rapid and complete cessation of the discharge is claimed in over 80 per cent. of cases.

T. RITCHIE RODGER.

*A Case of Lateral Intracranial Abscess associated with Double Acute Mastoiditis.* M. VLASTO and S. A. OWEN. (*Lancet*, Vol. i, 1922, p. 992).

A boy, 8 years, seen 29th Aug., ailing six days with pains in head and vomiting for three days. Delirious. Temp. 102.4°. Pulse 140. Profuse diarrhœa. Pupils equal. Neck rigid, head retraction, Kernig's sign. Tenderness behind both ears. Double Schwarzte operation and lumbar puncture (slightly turbid fluid under pressure—sterile). Condition same for nine days; five days after operation, erysipelas spread from left mastoid wound. Incontinence of urine and fæces, coma. Eighth day, 10 c.cm. of antistreptococcic serum given. Eight days later, improved. Several superficial abscesses. 30th Sept., headache and vomiting, with subnormal temperature appeared, and a week later he was lethargic and wasting. Both middle fossæ were explored without result, but patient greatly improved. On 12th Nov., there was a further relapse, with vomiting and severe frontal headache. On the 18th he was drowsy and the left upper limb showed clonic movements. Both cerebellar fossæ were explored through an inverted U-shaped incision. No abscess was found. The boy recovered from the operation, but died suddenly two days later. *Post mortem*—The meninges anterior to the right decompression wound

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were fused together to form part of the wall of a very large collection of pus, situated in the right middle and anterior fossæ. There was over half a pint of pus in the cavity. Culture showed gram + diplococci and staphylococci.

MACLEOD YEARSLEY.

*Spontaneous Escape of Cerebro-spinal Fluid from the Ear.* Dr D. VAN CANEGHEM BRUGES. (*Bulletin d'Oto-Rhino-Laryngologie*, Paris, September 1921.)

The author draws attention to the rarity of this condition without any precedent cause. The patient, a woman of 72, had had otorrhœa thirty years before, but certainly no discharge for twenty-five years. She was blind in the right eye from optic neuritis, but had fair vision in the left; no syphilitic history; Wassermann negative.

In March 1920, she complained of impaired hearing in the right ear; some flakes of epidermis were removed and relief obtained. In May 1920, a sudden rushing noise was heard while out walking; this attracted little attention, but next day the pillow was soaked, and advice sought for a discharge from the right ear. On examination a small central perforation of the tympanum was seen, through which a clear fluid escaped, synchronously with the pulse. Analysis showed that this was normal cerebro-spinal fluid. No pain or vertigo was observed; a whisper was just heard in the right ear. Since then the discharge has continued quite regularly, increasing on lowering the head. Two measurements showed rates of 288 c.c. per diem and 384 c.c. per diem. There was no evidence of trauma or infection. The case has been observed fourteen months without change, mental and bodily functions remaining unimpaired, a slight headache being noticed occasionally. The author can suggest no explanation of the condition.

E. WATSON-WILLIAMS.

*A Contribution to the Theory of Chronic Catarrh of the Middle Ear.* J. HABERMANN. (With two illustrations. *Archiv. für Ohren-Nasen- und Kehlkopfheilkunde*, April 1922.)

Chronic catarrh of the middle ear played a more important rôle in otology formerly than at the present day, modern methods having established as separate entities various affections previously regarded as identical. There is still some divergence of opinion on the subject, probably because material for histological study is seldom available.

Habermann describes the microscopic appearances of the temporal bone of a woman, the subject of chronic catarrh of the middle ear, who died of pernicious anæmia at the age of 64. The normal longitudinal folds of the Eustachian tube were exaggerated, appearing in transverse section as high papillary outgrowths covered with tall

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cylindrical epithelium. The lumen of the tube and the interior of the tympanic cavity were filled with glairy mucus, traversed by lacunæ caused by the action of the fixative. The drumhead was much retracted, nearly touching the hypertrophied mucous membrane of the promontory. Other abnormal appearances, described in detail, included some localised hæmorrhages into the internal auditory meatus, in which the blood corpuscles showed the characteristics of pernicious anæmia.

Habermann compares this state of affairs to that found by Brock in three cases of obliteration of the Eustachian tube by malignant tumours of the naso-pharynx. Here there was serous exudation into the tympanic cavity and its adnexa, attributable to *hydrops ex vacuo* rather than to inflammation. He also alludes to the work of Karl Beck of Heidelberg who, experimenting with dogs, closed the Eustachian tube with wooden plugs, or as was found more effective, with the thermo-cautery. After killing the animals, microscopic examination revealed hypertrophy and cellular infiltration of the mucous membrane, some bony thickening, and a sterile exudate containing polymorphs and lymphocytes. This research had the drawback that the tube was obliterated only for a comparatively brief period.

Habermann maintains that chronic catarrh of the middle ear differs alike from *hydrops ex vacuo*, from adhesive processes, and from the residues of suppuration, and that the proliferative changes in the mucosa exactly correspond with those found in chronic nasal catarrh.

WM. OLIVER LODGE.

*Otosclerosis.* Dr A. A. GRAY. (*Laryngoscope*,  
Vol. xxxi., No. 7, p. 422.)

A short review on the present knowledge of otosclerosis. "The cause of otosclerosis, that is, the condition without which the disease cannot occur, is to be found in the organ of hearing itself, and further, this condition exists in the organ of hearing of certain individuals and in these individuals only." The disease is idiopathic and occurs in those with an inborn tendency to it.

The pathological changes are: (1) Absorption of old bone followed by deposition of new bone; (2) absorption of bone without deposition of new bone; (3) absorption and deposition; but the second is the more rapid, so that rarefaction takes place leaving an area with only a few fine trabeculæ of bone, the large spaces being filled with marrow.

In an early case of otosclerosis osteoclasts are abundantly present along the line of demarcation. In old cases when staining is faint, no osteoclasts are found but no absorption is taking place. No new facts are known of tinnitus and paracusis.

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Fröschel's test of the sensitiveness of the tympanic membrane to touch with a feather is useful, but to establish a standard is difficult. The meatus and membrane are less sensitive in otosclerosis.

ANDREW CAMPBELL.

*Otosclerosis and Tetany.* E. ROCH. (*Zeitschr. f. Ohrenheilk.*, 1920, Band 80, Heft 1-2.)

With reference to the possible connection between otosclerosis and disturbances of the ductless glands, more especially of the parathyroids, Mayer had examined the parathyroids in 6 cases of otosclerosis in which no changes were found. Frey and Orzechowski, on the other hand, had examined 5 cases of undoubted otosclerosis and found in all of them symptoms of latent tetany. With a view to ascertaining the facts of the case, Roch examined 16 typical cases of undoubted otosclerosis. He found symptoms of latent tetany in none of them. There were no cramps. The cardinal symptom of latent tetany, namely, the increase in the galvanic excitability of the nerves, was present in not a single case. Further, there was no increase in the mechanical excitability of the motor nerves. He concludes that the cases of Frey and Orzechowski were a purely accidental combination of otosclerosis and latent tetany in a region where the latter was very prevalent. He concludes from his own investigations that there is no connection between these two conditions.

J. K. MILNE DICKIE.

*The Mechanism of Cold Water Nystagmus in Rabbits.* A. DE KLEYN und W. STORM VAN LEEUVEN. (*Albrecht von Graefe's Archiv. für Ophthalmologie.* Sonderabdruck aus Band 107, Heft 2-3.)

The interpretation of nystagmus, induced by cold-water irrigation, depends principally on two theories.

Bárány holds that as the result of the local cooling of the labyrinth wall, convection currents are induced in one or more of the semi-circular canals, and that, according to the relative positions of the ampulla and the portion of the semi-circular canal thus cooled, a current is induced in the endolymph either towards or from the ampulla. Nystagmus so induced is directed towards the contra lateral side.

Bartels holds the view that cold water acts as a depressant agent on the labyrinth, so that the resulting nystagmus is comparable to that which follows a unilateral labyrinthectomy; whilst he suggests that irrigation with hot water constitutes a stimulation of the vestibular nerve of the same side.

With Bartels' theory, prior to their investigations, the authors were unable to agree; since, if this theory were correct, no nystagmus

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could be induced by irrigation of the intact ear by cold water after a labyrinthectomy of the opposite side, a result which previous observers have found to be incorrect.

After a further discussion of these theories, the authors describe in detail the experiments which they have carried out on rabbits to test the value of the same.

## Summary:—

- (1) Bárány's theory was confirmed. Bartels' theory was disproved.
- (2) The determining factor in the nystagmus, induced by cold-water irrigation, is the cooling of the horizontal semi-circular canal; although in most instances the vertical canal must also contribute a small influence.
- (3) As their previous experiments on cats showed, Magnus and de Kleyn determined that cold-water irrigation of the external auditory meatus induced a definite cooling of the labyrinth wall.
- (4) Variations of the position of the head in space induce a compensatory position of the eyeballs, which must also be taken into account in investigation of the resulting nystagmus from cold-water irrigation.

ALEX. R. TWEEDIE.

## *Researches on the Quick Component of Vestibular Nystagmus in Rabbits.*

A. DE KLEYN. (Albrecht von Graefes' *Archiv. für Ophthalmologie*. Sonderabdruck aus Band 107, Heft 4.)

The origin of the quick component of vestibular nystagmus has attracted the attention of the author, as many theories have been propounded on the subject and little experimental work done. It is only, however, with the object of testing Bartels' theory that this account deals.

Bartels considered that the quick component is entirely to be referred to a peripheral origin, and that when nystagmus is induced by stimulation of the labyrinth, contraction takes place in definite eye-muscles, whilst their antagonistic group are relaxed.

Bartels later modified his original idea that contraction of the orbital muscles, during the slow phase, affected the terminations of the fifth nerve in the orbit, and thus stimulated the reflex for the quick phase; he did so in accordance with the results found by Tozer and Sherrington in their experiments, which indicated that the reflex-origin for the quick phase of the nystagmus lay in the terminations of the proprioceptive nerve-endings.

*Conclusions.*—1. Experimental research on rabbits does not support the opinion of Bartels that the quick phase of vestibular nystagmus is

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caused by stimulations of the proprioceptive nerve-endings in the eye-muscles during the slow phase.

After injection of a weak concentration of novocain in an isolated *M. rectus externus*, with its Abducens nerve remaining intact, and with the division of all the remaining oculo-motor nerves, no change is caused in the nystagmus. With stronger concentrations which lead to a gradual paralysis of these motor nerve endings as well, the quick phase is still demonstrable until the muscles become paralysed.

2. The quick phase of vestibular nystagmus must therefore have a central and not peripheral origin.

3. A normal vestibular nystagmus towards either side can be induced in rabbits if:—

- (a) The cerebrum is removed (Högyes, Bauer, and Leidler).
- (b) The cerebellum is removed (de Kleyn and Magnus).
- (c) All the oculo-motor nerves (with the exception of one abducens) and both trigeminal nerves are divided.
- (d) Both oculo-motor nuclei and both trochlear nuclei are removed.
- (e) After a transverse division of the medulla at about the level of the lower border of the nuclei of the 8th nerves (Högyes).

ALEX. R. TWEEDIE.

*Clinical Contribution on the Question of Amusia.* HANS BRUNNER.  
(*Archiv. für Ohren-, Nasen- und Kehlkopfheilkunde*, Jan. 1922.)

Loss of ability to produce tuneful, musical, or rhythmical sounds is a rare sequel to injury or disease of the brain, hence the two cases of amusia which Brunner describes have much intrinsic interest, though neither throws any great light upon the cerebral mechanism which subserves this faculty, nor probes to any extent the function of those parts of the brain known as "silent areas."

The first patient (Ullrich) was a man of 35 who, having had a running ear for twelve months, was admitted to the Polyclinic at Vienna, with headache, vomiting, hyperæmia of the right optic papilla, and Kernig's sign. After an exploratory mastoid operation he did well for a time, but was re-admitted seven weeks later with the classical symptoms of right temporo-sphenoidal abscess, including left hemiparesis and hemianopsia. After drainage of the abscess all went well until two years later, when the patient commenced to have epileptic fits, which were preceded by an olfactory and gustatory aura. His memory was poor, words did not come to him readily, and his articulation was imperfect. The movements of the left hand were clumsy—he was right-handed in most actions.

The musical disability became manifest three years after operation. Before the illness the patient often sang in company; now, when asked to sing some favourite ballad, the words and the rhythm were

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correct but all the notes were false. Neither could he imitate the pitch of a sound nor sing a scale.

The second patient, a man of 30, had been musical up to twelve months after a shrapnel wound of the head in 1914. In 1920, he was unable to tune his violin, and on attempting the gamut sang up to G correctly, then suddenly wavered and stopped. There was no corresponding lack of tone perception, and he could whistle relatively well. He had slight sensory aphasia, and his writing was full of mistakes. Beyond a depressed scar in the left frontal region there were no other physical signs. He was right-handed.

Henschen, Edgren, and Mendel are more or less agreed that the cortical centres for perception of music and rhythm are in the anterior third of the first convolution of the temporo-sphenoidal lobe of the dominant side of the brain; that is, the left in right-handed persons. Pfeiffer postulates a psychical centre in the radiations leading from this cortical area, destruction of which results in amusia in spite of preservation of continuous tone perception by the centre of the opposite side; and he has also ascertained that the cortical representation of high tones is dorsal to that of low tones.

The existence of a separate motor centre for singing is doubtful, though patients with aphemia may be able to sing. Henschen believes, with Horsley and Vogt, that it is in the left hemisphere adjacent to Broca's convolution, but Mendel, Mann, and others place it in the second right frontal convolution. The vocal cords appear to have a bilateral innervation. In the internal capsule the phonatory fibres are deep and anterior to the pharyngo-linguo-facial fibres.

Brunner argues that his two cases cannot be explained by any single lesion. Probably the amusia was due to the epileptic disturbance in the first case and to neurasthenia in the second.

WM. OLIVER LODGE.

## LARYNX.

*Treatment of Tuberculous Laryngitis by Salts of the Rare Metals of the Cerium Group.* GEORGES PORTMANN, Bordeaux (*La Presse Medicale*, 18th February 1922).

Grenet and Drouin, applying to man the work done by Frouin on animals, investigated the effect on tuberculosis of intravenous injections of these salts. They gave twenty injections of a 2-per-cent. solution didymium sulphate, and found that this produced some interesting blood changes consisting mainly in (1) a leucocytosis (50,000 per c.mm.) in which the mononuclear cells preponderated; (2) an increase in the total number of red cells; and (3) an alteration in the albumin content of the serum and the physical properties of the clot. The tubercle bacilli themselves showed morphological evidence of attenuation and

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the sputum became innocuous to guinea-pigs. The writer investigated the effect of similar treatment on twenty-one cases of tuberculous laryngitis at different stages in the disease, giving a series of twenty daily injections of 4 to 10 centigrammes (in 2-per-cent. aqueous solution) of the sulphates of neodymium, praseodymium, samarium and lanthanum. Their report is not enthusiastic, and the benefit in their cases, though marked, was confined to the earliest (*i.e.* catarrhal) stage. They find the treatment contraindicated when there is œdema and ulceration of the larynx, or where there is fever present. They condemn without qualification intratracheal injections (which they used in oily solution), and intra-muscular or subcutaneous injections (used in lipid solution). The article contains a full series of references to the recent French literature on the subject. F. J. CLEMINSON.

*Ventriculo-Corpectomy.* CHEVALIER JACKSON. *Archives of Surgery*,  
March 1922.

The writer has applied this name to an operation which he believes to be the ideal treatment of laryngeal stenosis when such stenosis is due solely to paralysis and when no cicatricial contraction exists. The majority of cases of bilateral laryngeal paralysis thus treated (seven of which are reported in detail) were the result of goitre and illustrate the necessity for laryngeal examination before thyroidectomy.

On account of the possibility of spontaneous recovery it is unwise to perform ventriculo-corpectomy until the abductor paralysis has been established for a year, and during this waiting period the patient may require the relief afforded by a low tracheotomy. High tracheotomy must be condemned and division of the cricoid cartilage may cause hopeless stenosis.

Jackson is of opinion that after his operation, as after removal of a cord by laryngo-fissure, the lateral crico-arytenoid muscle continues to function, and drags out an adventitious cord from the scar tissue.

Ventriculo-corpectomy consists in the removal of the vocal cord and floor of the ventricle by punch forceps introduced through the direct laryngoscope. In all cases the operation is performed on one side and then, after healing is complete, on the other. In children (one case of congenital laryngeal stridor due to paralysis is described) no anæsthetic is used, in adults local anæsthesia only. The arytenoid cartilage must be carefully preserved. No after-treatment is required and healing is complete within three weeks. The lumen of the tracheotomy tube may now be gradually diminished by partial corking and should not be removed until a "full cork" has been worn day and night for a month. It may be necessary to close the trachea by dissecting out the fistula in tube form, ligating and dividing it, and then closing the wound over the stump. DOUGLAS GUTHRIE.



# Miscellaneous

## MISCELLANEOUS.

*The Treatment of Cocaine Poisoning.* K. MAYER. (*Zeitschrift für Ohrenheilkunde*, 82 Bd., p. 42, 1922.)

It has been shown experimentally that when a given dose of cocaine is well diluted, it is three or four times less toxic to rabbits than the same dose in concentrated form. Kochmann and Zorn, in 1913, found that the addition of salts of potassium greatly increased the anæsthetic action of the cocaine, and Hirsch, following this up, found that a 3 per cent. solution with 2 per cent. potassium sulphate had as great an effect as 10 per cent. cocaine without the potash salts. However, it was found that the weak solution of cocaine with potash was just as toxic as the stronger solution of cocaine alone. Some highly toxic compound is evidently formed, as controls with cocaine alone and others with potash alone did not show the toxic effects. The addition of potash salts increases the toxicity of cocaine seven times.

The symptoms of cocaine poisoning vary considerably in man. The mildest cases show a tendency to fainting, precordial discomfort, nausea, and rapid pulse. Psychic exaltation, talkativeness, etc., may be noted. Severer cases show epileptiform convulsions with unconsciousness, pallor, and dilated pupils. A paralytic stage follows and death occurs from paralysis of the respiratory centres.

As antidotes ether, chloroform, or morphia have been recommended. Morphia has the very serious drawback that it also is a drug, with a tendency to cause respiratory paralysis, and hence when the irritative stage is over the morphia and the cocaine act together as respiratory depressants. Mayer, in a series of experiments on frogs, found that when  $\frac{1}{6}$  or  $\frac{1}{4}$  of the lethal dose of cocaine was injected along with a small dose of morphia, which would otherwise have been harmless, the animals died. Control animals with cocaine alone or morphia alone did not die. Hofvendahl, in 1921, had the same results in dogs and rabbits, and concluded that the administration of morphia in cocaine poisoning was useless, and even harmful. It does not follow from this that all combinations of morphia and cocaine must be avoided. The administration of morphia beforehand allows one to be more sparing in the use of cocaine, and hence a toxic dose is less likely to be reached. However, morphia must never be given when there is already any symptom, however slight, of cocaine poisoning. Amyl nitrite acts only symptomatically. Pilocarpin has been reported as bringing about a rapid recovery in a case of cocaine poisoning, but this result was not confirmed in animal experiments. Other narcotics, such as veronal, chloral hydrate, etc., are open to the same objections as morphia. A drug is required which does not depress but stimulates the respiratory centres. Strychnine is unsuitable as it is itself apt to produce cramps and convulsions. In calcium chloride, however,

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we possess a remedy which stimulates the respiratory centre without these drawbacks, as was shown by Auer and Meltzer in 1906. Mayer found that a severely poisoned frog's heart could be brought back to normal with calcium chloride. A previous dose of calcium chloride either prevents or greatly diminishes the action of the cocaine. Similar results were obtained with guinea-pig uterus. This pharmacological antagonism was further proved on animals. That it was not due to slowing of absorption was shown by the fact that the paralytic symptoms came on at the same time in the animal with cocaine alone as in that with cocaine and calcium. Even when the calcium chloride was given ten minutes after the cocaine, *i.e.*, when the paralytic symptoms were already present, a speedy recovery was produced.

Mayer injected into guinea-pigs a dose of cocaine in 1 per cent. solution which definitely exceeded the lethal dose, and at the same time injected four times the amount of calcium chloride in 3 per cent. solution. The animals had severe convulsions but recovered in an hour. In other animals the injection of lethal doses of cocaine with calcium gave no toxic symptoms.

Mayer has used calcium chloride in slight cases of cocaine poisoning in the human subject with satisfactory results. He recommends 5 to 10 c.c. of a 10 per cent. solution given intravenously. If given subcutaneously a troublesome infiltration is produced. Other soluble salts of calcium may also be used as it is the calcium ion which is important.

J. K. MILNE DICKIE.

*A New Local Hæmostatic.* A. PUGNAT. (*L'Oto-Rhino-Laryngologie Internationale*, April 1922.)

Wooldridge and Roger have demonstrated that organic extracts shorten the normal coagulation period of the blood, and that in this respect pulmonary extract is the most powerful. Following on these researches, Pognat has used dried and powdered pulmonary extract as a local hæmostatic in the nose. He first employed it as an insufflation during the performance of a turbinectomy to control hæmorrhage. Alypin was employed instead of cocaine as a local anæsthetic to avoid any vaso-constrictor effect, and the insufflations of pulmonary extract were found to arrest the hæmorrhage immediately. It was next employed to prevent reactional hæmorrhage after operations performed under cocaine adrenalin anæsthesia, by insufflating it over the area of operation, and here again its use proved successful. Its use in cases of spontaneous epistaxis was successful on two occasions but in a third proved ineffective. In the last case the coagulation time was much prolonged, and it is suggested that these organic extracts are only helpful when the blood constituents are normal.

A. J. WRIGHT.

## Reviews of Books

*The Development of the Human Dental Mechanism: the Significance of the Deciduous Teeth: Orthodontia as an Aid to Pediatrics.*

W. STANLEY WILKINSON. (*Medical Journal of Australia*, 22nd July 1922, No. 4, Vol. cxvii.)

The symmetry of the facial bones is largely dependent on the correct development of the teeth.

The width of the nasal cavities and of the sphenoid bone which accommodates the *hypophysis cerebri* are both directly influenced by dental development, and by the action of muscles of mastication.

The apices of the bicuspid and molar teeth are on the same level as the floor of the nose, and expansion of any or all of them will result in nasal expansion.

Mal-position of the teeth throws the muscles of mastication out of proper alignment, hence the facial bones to which the muscles are attached are not developed on normal lines. Malformation of the facial bones, resulting in high arched palate and contracted nasal fossæ, cannot be treated satisfactorily without the co-operation of the orthodontist, who is able to expand the palate, and secure a proper apposition of the teeth.

The influence of the deciduous teeth on the development of the bones of the face is described; their injudicious extraction is to be avoided.

Modern methods apply expansion to the roots not the crowns of the teeth, and as the roots are on a level with the floor of the nose the nasal cavity is also widened. The paper is well illustrated.

A. J. BRADY.

## REVIEWS OF BOOKS

*The Medical Annual: A Year-Book of Treatment and Practitioner's Index for 1922* (fortieth year). Pp. 596. Bristol: JOHN WRIGHT & SONS, LTD. London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd. Price 2os. net.

Every year finds one more and more dependent on the row of Medical Annuals on one's bookshelves, for information not merely on our special subjects but also on general medical and surgical questions which no self-respecting specialist can afford to forget or ignore. In the present volume Mr Wright has taken up the work long carried on so well by Dr Watson Williams and Dr Fraser. He has served up a thoroughly good menu, both satisfying and digestible.

Otitis media, acute and chronic, with their complications, receive attention in well-written articles. For cavernous sinus thrombosis,

## Reviews of Books

repeated bleeding from the sigmoid sinus is recommended. This was advocated by Körner many years ago and does not seem to have received the attention it deserved.

Chevalier Jackson condemns high tracheotomy as being a very usual cause of laryngeal stenosis. Attention is drawn to the association of accessory sinus disease with bronchitis and bronchiectasis as well as with chronic bronchorrhœa resembling tuberculosis. Among new points in relation to frontal sinusitis we note Unger's use of india-rubber catheters introduced through the natural orifice on a probe. The vital dilatation effected by india-rubber tubes in the larynx and elsewhere is probably in action here though it is not mentioned as such. In malignant disease of the sinuses Barnes's recommendation of Moure's operation followed by retention of a tube of radium emanation is quoted. The references are numerous and full.

In addition to our own special subjects the Annual deals with almost every possible branch of the healing art in even more than the usual complete manner. In general medical and surgical interest it surpasses itself. We may cite Hey Groves' article on orthopædic surgery and most particularly Langdon Brown's masterly and attractive study of the endocrine glands. Cancer is considered from every point of view, but especially in Thurstan Holland's articles on Radiotherapy. Unusually long articles are devoted to Mental Disease (Stanford Read), modern Psychological Medicine (Hadfield), Skin Diseases (Graham Little), Protein Sensitisation (French), Anæsthetics (Blomfield), and particularly the Surgery of the Thyroid Gland (James Berry). The influence of the tonsils in affording a focus for infections of great variety, is emphasised by many writers as in alopecia areata, exophthalmic goitre and, among other diseases, mononuclear leucocytosis.

The Annual will this year be found more valuable than ever to the practitioner, whether general or special. JAS. DUNDAS-GRANT.

*Atti della Clinica Oto-Rino-Laryngoiatrica della R. Università di Roma.* GIUSEPPE FARRI, Roma. 1921.

The eighteenth annual volume of the published works of the Royal Oto-laryngological Clinic in Rome for the year 1920 is well up to the standard of its predecessors, and Professor Ferreri is to be congratulated on its quality. It consists of 479 pages of original matter contributed by the members of the clinic, and contains a bibliography of Italian work for the years 1918-19 compiled by Dr Vitto Massei. It is rather invidious to pick out one or two of a series of about twenty articles, but one by Bilancioni is worthy of mention in that it gives a fairly complete resumé on the subject of cholesteatoma of the ear illustrated by

## Letters to the Editors

beautiful plates. Ferreri contributes an interesting article on the voice of eunuchs and castrati, Torrini a long account of naso-pharyngeal fibromas, and Bilancioni one on the syrinx of birds. Torrini in his article reports four new cases of naso-pharyngeal fibroma, three of which were treated by radium with great success. One of the cases had an enormous growth which protruded from the right nostril and had displaced all the bones of the face, causing very great deformity. Operation, which would have been attended by great risk, was refused and the patient was treated by applications of radium at fairly long intervals from April 1916 till December 1918, resulting in complete disappearance of the growth. Two other cases were also treated by radium and one by operation with perfect results. The whole subject is discussed at great length by the author. Many of the papers show an amount of painstaking research, to a great extent experimental, which reflects great credit on their school.

J. K. MILNE DICKIE.

## LETTERS TO THE EDITORS

TO THE EDITORS,

*The Journal of Laryngology.*

DEAR SIRS,—From the description given of my experiment on the human larynx intended to indicate a possible, nay probable, mechanism of the production of the air-sac in Dr Frederick Spicer's remarkable case of Laryngocele, and which is quoted by Dr Irwin Moore, it is obvious that I have not made the experiment as clear as I thought I had done.

On page 387 of the August issue of the Journal, Dr Irwin Moore refers to me as "showing how an artificial 'emphysema' of the right half of the larynx could be produced by the forcing of air under the mucosa of the subglottic space, by puncturing the subcordal mucous membrane with a needle attached to a syringe," and "this," he says, "cannot satisfactorily explain the condition in the case under discussion."

My experiment was briefly as follows:—I fixed the vocal cords in close apposition by means of a needle passed through the arytenoid cartilages, and "tensed" them by traction backwards on this needle and forwards on the hyoid bone (bringing the thyroid cartilage with it). I thus placed the cords under the *natural* conditions for phonation. I then blew air in the *natural* way up through the trachea from below, as in phonation, and produced a vocal tone. In the next place I passed a recurved knife from above through the glottic chink, and

## Letters to the Editors

made a cut in the mucous membrane below the edge of one cord. The blowing was then resumed and a swelling developed in the ary-epiglottic fold, the ventricular band and the floor of the ventricle.

The appearance, if not absolutely identical with that seen in Dr Spicer's case of "laryngocele" (laryngeal pneumatocele), was so very like it as to warrant the opinion that the same mechanical factors might have operated in both, and that the existence of an opening in the mucous membrane below the edge of the vocal cord, whether traumatic or ulcerative, could "satisfactorily explain the condition in the case under discussion."

The swelling commencing as an emphysema, may by the breaking down of the connective tissue be reasonably expected to develop into a pneumatocele, the wall of which is formed in part by the everted saccule and ventricle, when these ultimately become detached from their moorings by the pressure of the air.

I hope to prepare a more detailed account of my experiment.—  
Yours faithfully, JAMES DUNDAS-GRANT.

LONDON.

THE EDITORS,

*The Journal of Laryngology.*

DEAR SIRS,—I wish to draw attention to the fact that nearly all text-books on Ear, Nose, and Throat Diseases repeat the old diagram indicating the site of incision in peritonsillar abscess. The incision is made by means of a knife, or sharp-pointed forceps, through the substance of the palate. I do not think this is right and I always approach the abscess, by suitably curved tonsil pressure forceps—long artery clamps—through the inner wall of the abscess between the pillars and above the tonsil. Here the tissues perforate like wet blotting paper. Following this, I insert a gloved finger and break down any septa and push down the upper pole of the tonsil partially detaching it. This drains well. As I believe the tonsil should be enucleated at a subsequent date, there are fewer adhesions to encounter and the operation is more successful. Again, incision of the palate, to me, is bad practice.

In evacuating intra-tonsillar abscesses I insert the forceps between the anterior pillar and the tonsil, and pass them down to the capsule, withdrawing them with the blades open. My finger is here also inserted to break down loculi.

Needless to say a general anæsthetic is used and the patient is immediately turned over on his face so that the mouth is facing the floor, free of the table. The head is not bent on the neck or trunk at all.

# Obituary

Is there any danger in enucleating these tonsils at once? The Sluder-Sauer method leaves a smooth surface which cannot absorb to any extent.—Yours faithfully, T. A. MACGIBBON, M.D., F.R.C.S.E.

CHRISTCHURCH, N.Z.

TO THE EDITORS,

*The Journal of Laryngology.*

SIRS,—In the October number of the Journal, Dr T. A. MacGibbon, New Zealand, says in reference to my method of employing "The Blood-Clot Method of Closing the Mastoid," that he accepts my statements, but they do not satisfy him.

It may encourage him to give the method a fair trial if I enclose a letter from Mr Wilfrid Glegg, of Birmingham, who has given me permission to publish it.

DEAR MR TILLEY,—In reference to your letter in the May number of the *Journal of Laryngology*, it may interest you to know that "The Blood-Clot Method of Closing the Mastoid" has been the method of choice at the Ear and Throat Hospital in acute cases since first you advised it, and it has been attended with such satisfactory results as to call for no comment other than approval.

W. GLEGG.

At the least, such testimony shows that my experience is shared by other aural surgeons of experience, and in this category I may mention Mr Woodman of Birmingham, and Dr Macnab of Johannesburg.

At the risk of repetition I would say again that there are two indispensable factors in obtaining a successful result: (1) The complete removal of all infected areas: (2) Effectual sterilisation of the bone and soft parts involved in the acute mastoid suppuration.

I believe the second factor to be more easy of attainment if the field of operation is anointed with the mixture of bismuth, iodoform, and liquid paraffin, which is generally known as B.I.P.

HERBERT TILLEY.

LONDON.

## OBITUARY

JAMES DONELAN, M.B., M.Ch. (R.U.I.),

Surgeon, Throat and Nose Department, Italian Hospital, London.

It is with deep regret that we record the death of Dr James Donelan, well-known amongst Laryngologists, which occurred with tragic suddenness on 25th August, in his sixty-sixth year. He had been in poor health for some time owing to cardiac disease, but his general health had given no immediate cause for anxiety.

## Obituary

James Donelan received his medical education at Trinity College, Dublin, and at the École de Médecine, Paris ; he graduated M.B. and M.Ch. (with Honours) at the Royal University of Ireland in 1886, becoming L.M. in the same year. In 1889, he graduated B.A.O.R.

After holding several resident appointments in Dublin he settled in London in 1887, and began his laryngological career as Senior Clinical Assistant at the Throat Hospital, Golden Square, where he was associated with Sir Morell Mackenzie. For nearly five years (1887-92) he acted as private assistant to Mackenzie, and helped him in revising a contemplated second edition of his great work on *Diseases of the Nose and Throat*, which, however, never reached the completed stage for publication. He also carried out considerable research work for Morell Mackenzie in bringing up to date his chapters on "Goitre," which were to have formed a part of a section on "Diseases of the Neck" in the second edition of his major work.

He was left in charge of Mackenzie's practice whilst the latter was in Germany in attendance on the Emperor Frederick.

In 1895, following his appointment, he established and developed the Throat and Nose Department of the Italian Hospital, Queen's Square, and proved himself a most earnest and skilful worker. He held this appointment at the time of his death.

In 1909 he was made Chevalier, and in 1918, Officer of the Order of the Crown of Italy.

During the War he was Surgeon in temporary charge of an Ambulance Hospital at Crépy-en-Valois (Oise), during the first battle of the Aisne (Sept. 1914), and, from 1914 till 1916, was Medical Referee to the London Committee of the French Red Cross.

In the early period of the War (1914-16) he rendered considerable service by organising, in co-operation with the French Embassy, a short service system under which over 300 British and Colonial surgeons gave voluntary service, for short periods, to the French Medical Service.

In 1915, till the end of the War, he was a member of the Royal Italian Military Medical Commission for recruiting, and for his services he received his promotion in the Order of the Crown of Italy.

Other appointments held by him were those of Lecturer on Diseases of the Nose and Throat, Medical Graduates College, and Honorary Laryngologist to the Royal Society of Musicians.

Formerly Honorary Secretary and Member of the Laryngological Society of London, now merged in the Royal Society of Medicine, he became a Fellow of the Royal Society of Medicine and a Member of the Council of the Section of Laryngology.

In 1918-19 he was President, and it was during his tenure of office that the First Summer Congress of the Section of Laryngology was



## Obituary

initiated by his predecessor Dr Brown Kelly. He made himself a most popular President, and his presidential address, "Morell Mackenzie, the Father of British Laryngology," was a striking tribute to the great Master, and will remain a valuable contribution to literature, on account of his intimate personal acquaintance with Mackenzie. This Memoir, in which he described Morell Mackenzie as "one of the glories of British Science," has finally dissipated and silenced those calumnies so unjustly heaped on Mackenzie during the latter years of his life, and has permanently raised and secured his reputation on the pinnacle of fame—a position to which his brilliant life-work and services to Laryngology justly entitled him.

In 1895, James Donelan became a Member of the Collaborating Staff of the *Centralblatt für Laryngologie*, and from 1889 onwards he acted in a similar position in connection with the *Journal of Laryngology*.

His contributions to the specialty appeared mainly in the *Proceedings of the Royal Society of Medicine*, the *Journal of Laryngology*, and the *Lancet*. In debate he invariably showed a wide and profound knowledge of general medicine in relation to the specialty, seen most frequently in reference to the Thyroid Gland and General Neurology. In addition to his contributions to medical literature he wrote many articles (anonymously) to the press on a variety of subjects of wider interest, chiefly historical.

James Donelan was the eldest son of the late John Donnellan of Mount Kennett House, Limerick, and he adopted the present form of spelling his name in 1886. He married, in 1889, Sophia Annie, second daughter of the late Major-General James M'Killop Taylor, and is survived by his widow and daughter, and also by a son recently qualified at St Bartholomew's Hospital.

The *British Medical Journal* remarks, "James Donelan will perhaps be chiefly remembered as a genial link between the early days of laryngology in England and its status as a surgical specialty to-day. His private charities were many, and the poor were always a particular care to him. In his younger days he had been an oarsman of some note, having won several cups, and latterly he was a great lover of music, books, old silver, and furniture. His death may have well been hastened by his strenuous work in Paris during the recent International Congress of Oto-Laryngology; he was a Member of the Committee of Organisation, and spoke each day in English, French, and Italian, interpreting the speeches of other Members of the Congress." He returned home from Paris an over-tired man, to find a heavy accumulation of work awaiting him. It was while trying to grapple with this that he met his death.

James Donelan was highly thought of in the profession for his

# Electroscope and Endoscopic Tubes

personal qualities, and deeply respected by a large circle of patients—rich and poor. The medical profession mourns the passing of a distinguished member, and his many friends are the poorer by his death. In the memory of all he will retain an honoured place.

I. M.

Sir James Dundas-Grant writes:—"Those who only knew James Donelan as a professional confrère will miss a keen and decided but suave and conciliatory consultant, whose opinion was original, trustworthy, and always tactfully expressed. Those, however, who were fortunate enough to enjoy more intimate association with him in other relations of life will often longingly recall the sunny companion who could cap a classical quip, or join with beaming whole-heartedness in concerted amateur music, as well as in listening with fine critical appreciation to the performances of the recognised artists. This æsthetic side of his nature endeared him to the circle of friends who could sympathise with him in his scholarly and artistic bent. His musical voice and sunny smile were emblematic of his disposition and will not soon be forgotten by those who had the privilege of frequently meeting him."

## COMBINED ELECTROSCOPE AND ENDOSCOPIC TUBES WITH INTERCHANGEABLE PROXIMAL AND DISTAL LIGHTING, FOR DIRECT LARYNGO-TRACHEO-BRONCHOSCOPY AND ŒSOPHAGOSCOPY.

Designed by IRWIN MOORE, M.B., C.M., Edinburgh, Surgeon to the Hospital for Diseases of the Throat, Golden Square.

THE apparatus has been specially designed and constructed in order to remedy the many defects of the instruments at present in use; to simplify the technique and armamentarium; and to reduce the difficulties met with in the exploration of the Bronchi and Œsophagus.

The important feature is that both proximal and distal lighting is combined in one instrument, and their interchange is possible while the endoscope tube is *in situ*, without disturbing its position or necessitating its withdrawal; at the same time, it ensures an enlarged field of vision and intensity of light for illumination, which can only be satisfactorily obtained with tubes of large diameter.

**The Illuminating Apparatus.**—The *handle* consists of a hollow, flattened, oval metal tube, to the outer surface of which gripping plates are fixed for securing a firm and steady hold. From the lower extremity a solid curved hook projects, which not only further supports and prevents slipping of the hand, but also allows of gentle and graduated leverage. From the upper end of the handle, and at right angles to it, extends a square hollow arm—the tube carrier—to the extremity of which the

# Electroscope and Endoscopic Tubes

examining tubes are inserted and fixed by means of a binding screw. The aperture in the tube carrier will admit any of the endoscopic tubes at present in use.

In the centre of this arm a fitting with a binding screw is provided for the support and fixing of an extending shaft carrying the illuminating portion of the apparatus. This lamp-carrying shaft consists of an outer square tube fixed to the lamp holder, which slides up and down a square rod, providing an easy method of focusing the light, and does away with the disadvantage of raising or lowering the lamp carrier by means of the

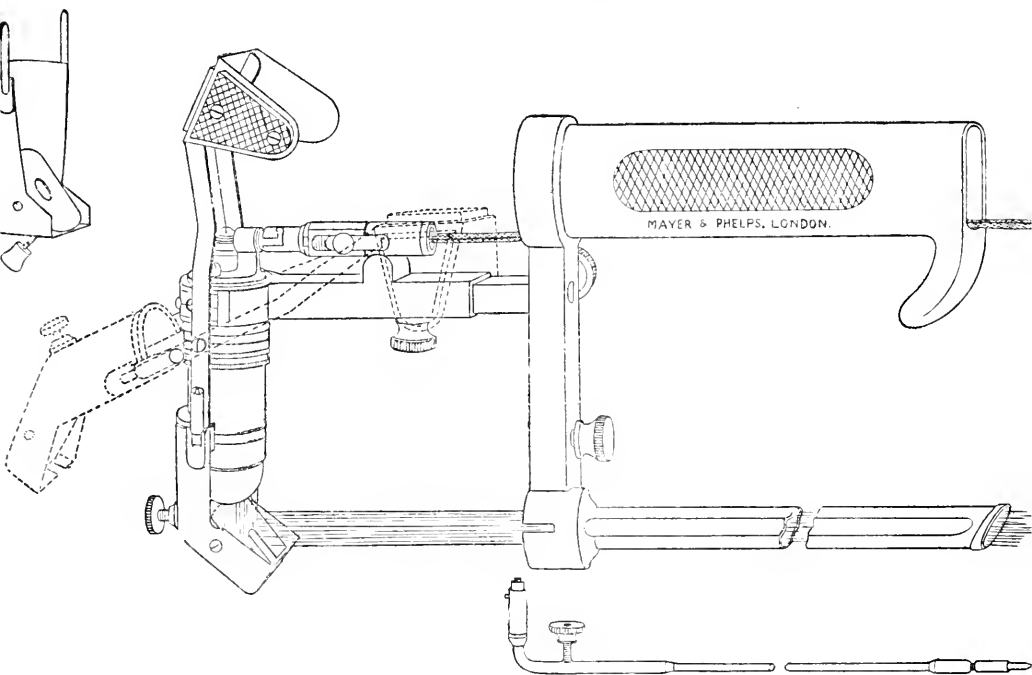


FIG. 1.—The Handle and Illuminating Apparatus.

telescopic extension shaft in Brünings' apparatus. By a simple turn of the screw which fixes the lamp shaft to the arm, the entire illuminating portion of the apparatus may immediately be removed or replaced. The handle by itself may be usefully employed in those cases in which it is desirable to use an electric head-light, after the Killian method, or reflected light from a laryngoscopic mirror.

Since the handle contains no mechanical or electrical connections, as in the Brünings' pattern, it may be readily boiled and sterilised, and, when not in use, a lidded box for storage of forcep ends may be kept in it.

The *optical portion* of the new Electroscope is constructed on the principle of the forehead lamp, used by Casper and Killian, and adapted by Brünings to his handle, the outer case, carrying the lens for condensation

## Electroscope and Endoscopic Tubes

of the light rays, being supplied with a small regulating knob for easy focusing.

Exchangeable hoods are provided, one with a mirror and central aperture, the other with a slotted mirror, the former supplying a larger surface, and hence providing a more powerful reflection and projection of the light to the extremity of the tube compared with the slotted mirror which, however, permits of easier swabbing or operative procedures under direct vision, and is preferred by many endoscopists. These hoods may be readily interchanged without disturbing the endoscopic tubes whilst in position in the lungs or œsophagus, to suit the requirements of individual operators.

The optical box is pivoted on a transverse spring hinge with a posterior extending arm and thumb-piece, by means of which it may be instantaneously

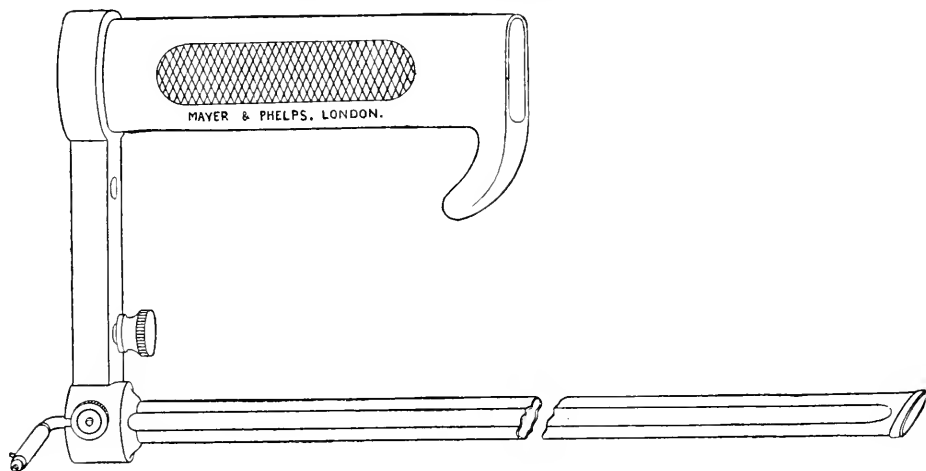


FIG. 2.—The Endoscopic Tubes.

raised out of the way of the mouth of the tube and line of vision by simple pressure of the thumb of the hand grasping the instrument, without altering the position of the endoscopic tube *in situ*. On removal of the thumb pressure, it immediately springs back into its normal position.

The advantages are obvious. This mechanism allows of the easy passage and free manipulation of instruments under direct inspection, without obstructing the field of operation; again, if the patient coughs, the mirror may be instantly switched out of the way, and therefore is not soiled by coughed-up material.

Also, by dispensing with the mechanism by means of which the handle is rotated from side to side in Brünings' instrument, displacement of the distal end of the endoscopic tube, which frequently occurs, is prevented.

**The Endoscopic Tubes.**—The tubes are designed on the main principle of the Chevalier Jackson tubes, but are made of a size corresponding to the diameter of the larger tubes of Killian, Brünings', and Hill. Their extremities are short-bevelled for easy insertion, after the pattern of

## General Notes

Hill and Chevalier Jackson. Passing down the inside of the tube an open half-circular slot is provided for the passage of the distal lighting carrier. In this way the light carrier is out of the way of instruments, and there is no reduction in the inside diameter of the tube. A simple binding screw attaches the light carrier to the mouth of the tube, and keeps it in position.

The connecting cable conveying the current from the accumulator battery to the lamp is passed through the hollow handle of the apparatus, and is attached by means of a bayonet-catch fitting terminal provided with a switch for cutting off the current.

The advantage of this arrangement is that the current may be easily switched off and on by the thumb of the left hand, without disturbing its grip on the handle of the apparatus. When exchanging the proximal for the distal light, or *vice versa*, by a simple turn of the connecting terminal, the attached cable may be disconnected.

In examining or operating on any case it is therefore possible, without altering the position of the tube or hand grasping the instrument, to interchange at a moment's notice the proximal and distal light, or *vice versa*.

It does away with the necessity of having two sets of apparatus, *e.g.* those of Brünings' and Chevalier Jackson.

**Electric Light Battery.**—The cells are arranged in two groups. Each group has its own rheostat and separate binding terminal, so that the higher voltage lamp used for proximal lighting may be connected with the higher voltage cells on one side of the battery, and the lower voltage distal lamp with the other. Two sets of connecting cables are supplied. In this way the distal lamp carrier is always ready for exchanging with the proximal light.

The apparatus has been manufactured for me by Messrs Mayer & Phelps, New Cavendish Street, to whom great credit is due for overcoming many mechanical difficulties.

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE,

1 Wimpole Street, London, W.1.

*Section of Otology*—President, Mr Hunter F. Tod, F.R.C.S. *Hon. Secretaries*, Mr F. J. Cleminson, M.Ch., and Mr Archer Ryland, F.R.C.S. Ed. The next Meeting of the Section will be held at 1 Wimpole Street on Friday, 17th November, at 5 P.M. Members who propose to show patients, specimens, etc., should communicate with the Senior Secretary, Mr F. J. Cleminson, 32 Harley Street, London, W.1, at least twelve days before the Meeting.

## General Notes

*Section of Laryngology*—President, Mr Charles A. Parker, F.R.C.S. Ed. Hon. Secretaries, Mr T. B. Layton, D.S.O., M.S., and Mr J. F. O'Malley, F.R.C.S. The next Meeting of the Section will be held at 1 Wimpole Street on Friday, 1st December, at 4.45 P.M. Members desirous of showing patients or specimens should communicate with the Senior Secretary, Mr T. B. Layton, M.S., 10 Welbeck Street, London, W.1, at least twelve days before the Meeting.

\* \* \*

### THE LATE DR JOKICHI TAKAMINE.

We are indebted to Dr Emil Mayer of New York for sending us a short notice of Dr Jokichi Takamine, who died in that city on 23rd July, in his sixty-eighth year. Dr Takamine was a chemist by profession, and he was the first to isolate the active principle of the suprarenal gland, which he named Adrenaline.

A native of Japan, and a graduate of the University of Tokyo, he was one of the early group of students sent by his country to study in foreign Universities. In recognition of his scientific discoveries, Dr Takamine was decorated by the Emperor of Japan with the Order of the Rising Sun, and he received the Degree of Doctor of Pharmacology from the University of Tokyo.

He settled in America, the land of his adoption, marrying an American lady by whom he had two sons. He devoted much of his time in seeking to effect a better understanding between that country and Japan. A sincere friend, a charming host, endowed with a kindly disposition and with many delightful traits of character, Dr Takamine's death will prove a great loss to many who knew him.

\* \* \*

During the present year, two valuable contributions to our knowledge of the brain and its surgery have appeared from the pen of two members of the profession in this country. One, entitled "The Clinical Symptoms of Cerebellar Disease and their Interpretation," formed the subject of the Croonian Lectures delivered by Dr Gordon Holmes, C.M.G.; the other "Brain Surgery," the Presidential Address of Sir William Macewen, C.B., at the Annual Meeting of the British Medical Association in Glasgow. Both addresses are deserving of very careful study by otologists. In the first, we are presented by a physician with an analysis of cerebellar symptomatology, based largely upon clinical observation and research, and demonstrating, by its excellence, how much this method of investigation can accomplish. In the second, we have the matured experience of a surgeon whose pioneer work on the pyogenic infections of the brain and its membranes, published just thirty years ago, became one of the classics in surgical literature.

Although both papers deal mainly with the subject of intracranial tumours, they should none the less, owing to the wide field covered by the authors, commend themselves to the attention of the otologist. His rôle in assisting the physician to locate the subtentorial lesion cannot now be overlooked, and his position will be strengthened not only by the skill with which he carries out and interprets the phenomena evoked by

## General Notes

the labyrinth tests, but by the acquisition of a more thorough knowledge of the anatomy of the brain.

Many of us must have been conscious of a feeling of regret that Sir William Macewen had maintained so long a period of silence upon a subject on which, in 1893, he had thrown so much light. The silence has been broken and again we have an opportunity of profiting from his expert knowledge. Various aspects of brain surgery are touched upon. Those which deal with abscess will appeal more directly to us. The contra-lateral paralysis of the face and arm in cases of large temporo-sphenoidal abscess, an observation first pointed out by Macewen in 1884, is a clinical picture which has stood the test of further experience. The necessity of handling with the greatest care the pia-arachnoid for the prevention of hæmorrhage and clot formation is emphasised. He dwells upon the value of adhesions, natural or artificial, in the subdural space before the cerebral abscess is opened, and he advocates exploration through the area of the original focus, thus keeping within the limits of Nature's adhesions, instead of opening directly through the skull as practised by some surgeons.

\* \* \*

The Faculty of Medicine of the University of Toronto has prepared a series of "optional courses" available to students during each of the years of the medical curriculum. The subjects cover not only many branches of medicine, but in the first and second year of study, French, German, History, Philosophy and Psychology are included amongst the optional courses. The student is encouraged, at an early period, to make up his mind as to the general type of medical career which he may desire to follow, and having done so, he is in a better position to select those optional subjects which will prove of greatest benefit to him.

Laryngology and Otology are not included amongst the optional subjects of the two last years of study. No attempt is made in the later period of the curriculum to train students as specialists. It is pointed out, very rightly, that it is unsound to give a specialist training to men until they have completed their medical and surgical education, and have served a year as interne in a hospital. For those men, however, who have definitely decided to practise these specialities, facilities are provided, during their "option hours," for taking courses in the scientific or fundamental branches which form the bases of these specialties; amongst these may be mentioned acoustics and other aspects of physics. Presumably revisal courses in the anatomy of the head and neck and in the physiology of the special senses would be included.

The Undergraduate Course in Oto-laryngology at the University of Toronto, which is compulsory, is one of ten weeks instruction. In the fourth year of study, five weeks are devoted to normal anatomy on the cadaver and on the living subject, and to methods of clinical examination. In the fifth year the student returns to further study for five weeks, when he deals with clinical cases illustrating the commoner pathological conditions, and he attends lectures upon the diseases ordinarily met with by the practitioner. He submits to a clinical examination at the Final Professional.

## General Notes

We take the liberty of reproducing from our esteemed contemporary *L'Informateur Médical*, Paris, the portraits of Dr and Mrs Urban Pritchard,



whose golden wedding we announced in the October number. The photograph was taken in the courtyard of the École de Médecine during the recent Meeting of the Tenth International Congress of Otology in Paris.

\* \* \*

Dr J. A. Moran Hemmeon, of Halifax, Nova Scotia, writes as follows :—  
“The interesting paragraph on Brétonneau, contributed to the July number of the *Journal* by Sir St Clair Thomson, prompts me to send the following note. In the city of Halifax, in the old St Paul's Cemetery, there is a small stone on which is inscribed :

WILLIAM GLEN, synanche trachealis,  
9th May, 1827, age, 1½ years.

ARTHUR GLEN, synanche maligna  
14th May, 1827, age, 4½ years.

Stranger, whether has disease or medical omission  
clad meast in their last cleath.

The above is exactly as inscribed. It may be that the stone-cutter made mistakes in the words. At anyrate, we can be quite sure of the sentiment.”



# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

EDITED BY

A. LOGAN TURNER AND J. S. FRASER

ASSISTED BY

DOUGLAS GUTHRIE AND IRWIN MOORE

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1. Original Articles are accepted on the condition that they have not been published elsewhere.

2. Manuscripts should be typewritten, on one side only of the paper, and well spaced.

3. Galley proofs and engraver's proofs of illustrations are sent to the author. Corrections, which should be kept to a minimum, must be clearly marked and no additional matter should be added.

4. The order for reprints should be sent when returning galley proofs, and for this purpose special forms are supplied, on which the price of the reprints is stated.

5. Authors of Original Communications on Oto-Laryngology in other Journals are invited to send a copy, or two reprints, to the *Journal of Laryngology*. If they are willing, at the same time, to submit their own abstract (in English, French, Italian, or German) it will be welcomed.

6. Editorial Communications should be addressed to "EDITORS, *Journal of Laryngology*, c/o Messrs OLIVER AND BOYD, Tweeddale Court, Edinburgh."

7. The Annual Subscription is Forty Shillings or Ten Dollars, and is payable in advance.

8. Single copies of back numbers, both of the present and the previous series, are on sale at Four Shillings (One Dollar) each.

9. An Annual Subscription can be commenced with any number of the Journal, and the preceding numbers of the current year can be purchased at Four Shillings (One Dollar) each.

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## DIRECT TREATMENT OF **INFLUENZA WITH VACCINES**

*The undermentioned Vaccines  
For Prophylactic and Therapeutic Use,  
are supplied.*

INFLUENZA VACCINE	ANTI-CATARRH VACCINE	THE VACCINE FOR COLDS
	<b>Prophylactic (A).</b>	<b>Curative (A).</b>
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B. Influenza . . . 30 millions	Pneumobacillus . . . 50 millions	Pneumobacillus . . . 25 millions
Pneumococcus . . . 100 millions	Micro Catarrhalis . . . 250 millions	Micro Catarrhalis . . . 100 millions
Streptococcus . . . 40 millions	B. Influenza . . . 250 millions	B. Influenza . . . 250 millions
	Diphtheroid (Oral) . . . 50 millions	Diphtheroid (Oral) . . . 25 millions
	Staphylococcus „ . . . 60 millions	Staphylococcus „ . . . 250 millions
	Streptococcus „ . . . 10 millions	Streptococcus „ . . . 5 millions
	<b>Prophylactic (B).</b>	<b>Curative (B).</b>
No. 2—Second Dose.	Pneumococcus . . . 50 millions	Pneumococcus . . . 50 millions
B. Influenza . . . 60 millions	Pneumobacillus . . . 100 millions	Pneumobacillus . . . 50 millions
Pneumococcus . . . 200 millions	Micro Catarrhalis . . . 500 millions	Micro Catarrhalis . . . 200 millions
Streptococcus . . . 80 millions	B. Influenza . . . 500 millions	B. Influenza . . . 500 millions
	Diphtheroid (Oral) . . . 100 millions	Diphtheroid (Oral) . . . 50 millions
	Staphylococcus „ . . . 800 millions	Staphylococcus „ . . . 500 millions
	Streptococcus „ . . . 20 millions	Streptococcus „ . . . 10 millions

*Prepared by*

The Research Laboratory of the Royal College of Physicians, Edinburgh

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# The Journal of Laryngology and Otology

(Founded in 1887 by MORELL MACKENZIE and NORRIS WOLFENDEN)

## BENIGN FORMS OF OTOGENIC MENINGITIS

By HOLGER MYGIND, C.B.E., M.D., Aural Surgeon to the  
Copenhagen Commune Hospital.

THE object of this paper is to lay before the Section of Otology of the Ninetieth Annual Meeting of the British Medical Association my experience of the benign forms of otogenic meningitis, based upon the observation of 210 patients with meningitis of all forms, caused directly or indirectly by acute or chronic middle-ear suppuration. All have been treated, and nearly all of them operated on, in my department of the Copenhagen Commune Hospital during the last seventeen years, and a post-mortem examination was made upon 133 of the patients who died.

**Clinical Material.**—The 210 cases were divided according to their age and the number of recoveries in the following way:—

TABLE I.—210 Cases of Otogenic Meningitis.

Under 1 year . . .	6, of whom	1 recovered, <i>i.e.</i>	16.6 per cent.	
1 to 4 years . . .	12, "	1 "	" 8.3 "	
5 " 14 " . . .	61, "	26 "	" 42.6 "	
15 " 19 " . . .	23, "	8 "	" 35.0 "	
20 " 29 " . . .	34, "	10 "	" 30.0 "	
30 " 39 " . . .	27, "	8 "	" 30.0 "	
40 " 49 " . . .	15, "	3 "	" 20.0 "	
50 years and over .	32, "	2 "	" 6.2 "	
All ages . . .	<u>210.</u> "	<u>59</u> "	" <u>28.0</u> "	

It will be seen from Table I. that benign forms of otogenic meningitis appear most frequently in children between five and fourteen years of age, and that the frequency is not only absolute

# Holger Mygind

but also relative. It will also be observed that children of this age are most frequently attacked by meningitis. This is due to the circumstance that middle-ear suppuration appears most frequently in this decade of life.\*

Further, the percentage of recoveries amongst children under five years of age is comparatively small, the absolute frequency of meningitis being, on the other hand, much less than might be expected from the frequency of middle-ear suppuration during this age.\*

Finally, it will be seen that the percentage of recoveries decreases in adults with increasing age, being particularly low after fifty years, while the number of patients attacked is much smaller than would be expected.\*

The youngest patient treated was ten months old, the oldest seventy-nine years. The youngest patient who recovered was ten months, the oldest fifty-one years.

The benign forms of otogenic meningitis appear principally amongst older children and young individuals under twenty years.

If the present material is divided into groups according to whether meningitis was uncomplicated, or complicated with other intracranial affections, the number of recoveries will be seen from Table II.

TABLE II.—210 *Cases of Meningitis, Solitary and Associated with other Intracranial Complications.*

			Total.	Recoveries.	Percentage.
Meningitis (uncomplicated)	.	.	115	38	33.0
„ + Sinusphlebitis .	.	.	42	16	38.1
„ + Brain Abscess †	.	.	21	4	19.0
„ + Subdural Abscess .	.	.	2	0	0.0
„ + „	+	{ Brain Abscess }	2	0	0.0
„ + Sinusphlebitis	+	{ Brain Abscess }	15	0	0.0
„ + „	+	{ Subdural Abscess }	6	0	0.0
„ + „	+	{ Brain Abscess† }	7	1	14.3
			<u>210</u>	<u>59</u>	<u>28.0</u>

Table II. shows that the greatest number of benign cases occur when meningitis is combined with phlebitis of the sigmoid sinus.

\* According to a statistical examination in the Oto-laryngological Department of the Commune Hospital. † Including encephalitis.

## Benign Forms of Otogenic Meningitis

The uncomplicated cases of meningitis exhibit a somewhat smaller percentage of recoveries. They were, on an average, operated upon on the third day after the first symptoms of meningitis had appeared. Curiously enough, the patients who died underwent operation, on an average, one day earlier. This is explained by the fact that in cases of this kind the meningeal symptoms develop more rapidly and with greater intensity, causing the patients to be brought earlier to the hospital. It will be seen, therefore, that a statistical proof of the unquestionable value of early operation cannot be given.

In connection with the deductions drawn from Tables I. and II., it may be mentioned that chronic suppuration of the middle-ear was more frequently the cause of benign than of malignant meningitis.

As to the influence of the different forms of bacteria, my material shows that pneumococcal infection plays the principal part in malignant cases, while streptococci are predominant in benign cases. Coli infection is especially malignant.

Finally, experience shows that cases of otogenic meningitis are brought to the hospital at some periods in such unusual numbers, that it gives the impression that epidemic influences are at work, and further, that otogenic meningitis at some periods is more benign than at others.

The benign forms of otogenic meningitis do not, however, appear solely amongst patients who recover. In a series of cases of meningitis complicated with other intracranial lesions, the meningitis disappears before death after having presented distinct objective symptoms.

Cases of this description are very interesting and have been discussed in literature, the negative findings at the post-mortem examinations having given rise to the opinion that phlebitis of the sigmoid sinus, cerebral and subdural abscess can produce meningitic changes in the cerebro-spinal fluid, as obtained by lumbar puncture, without any meningitis being present.

Before going into the details of this important matter, we must answer the question : What is meningitis?

**Pathological Definition.**—From a pathological aspect, meningitis is generally defined as a diffuse inflammation of the leptomeninges, with the formation of a purulent exudate in the subarachnoid spaces. That this definition does not hold good in all cases, will be seen from the following observations.

Amongst the 133 post-mortem examinations mentioned

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above, 4 did not reveal any macroscopic sign of meningitis, although the patients had exhibited distinct evidence of uncomplicated meningeal inflammation, the lumbar puncture having also given very turbid cerebro-spinal fluid. In 3 of those cases, a microscopic examination was performed, which showed distinct signs of diffuse acute leptomeningitis. These patients died within the first few days after the onset of the symptoms.

There are, further, 3 cases in which the clinical diagnosis of acute diffuse leptomeningitis was made, and where the post-mortem examination showed a "local meningitis." When, however, the leptomeninges outside of the "local meningitis" area were examined microscopically, distinct signs of inflammation were found.

Finally, there are a few instances of fatal intracranial lesions, where the cerebro-spinal fluid obtained by lumbar puncture showed meningitic changes, but where the macroscopic appearance of the leptomeninges was normal at the post-mortem, while the microscopic examination revealed the existence of leptomeningitis.

Reference to the cases discussed in literature shows that in none were the leptomeninges examined microscopically. They cannot, therefore, be used to prove that intracranial lesions, other than meningitis, can change the cerebro-spinal fluid in the same way as meningitis.

It will be seen, then, that in some cases absence of purulent exudate in the subarachnoid spaces, and of other macroscopic inflammatory signs, does not contradict the correctness of the clinical diagnosis of meningitis; also, that the results of lumbar puncture are sometimes safer than macroscopic examination of the leptomeninges.

Indeed, examination of the cerebro-spinal fluid *in vivo* is a very reliable and most important method of examination in aural surgery, and should never be omitted where there is the slightest suspicion of an intracranial lesion; it provides a means of detecting microscopically the most important inflammatory products of acute leptomeningitis from its very commencement, when macroscopic changes may yet be absent.

**Clinical Definition.**—As lumbar puncture must be considered of such great importance, I may perhaps be permitted to state briefly the experience I have had with about 2000 lumbar punctures.

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While the cerebro-spinal fluid obtained by lumbar puncture in cases of fatal meningitis does not, as a rule, become turbid before twelve to thirty-six hours have elapsed from the onset of the disease, pleocytosis may appear as early as three hours from the onset, and it is exceedingly rare that a case of otogenic meningitis is examined so early that an increase in the cells is not present. The only exception I have seen is Case I.

CASE I., No. 409/1918. — Female, aged 24. Admitted 23rd December—died 26th December 1918.

Acute suppuration of left middle-ear for ten days. During the last two days infiltration of the mastoid region took place. No labyrinthine symptoms except considerable reduction of hearing. Simple mastoid operation performed at once. Temperature the same evening, 99.0°. In the middle of the following night severe giddiness and repeated vomiting; later on, shivering. On 24th December the temperature was 104°; nystagmus to the sound side; hearing completely lost; slight rigidity of neck. Lumbar puncture revealed perfectly clear fluid with  $\frac{2}{3}$  cells per cubic millimetre in Fuchs-Rosenthal's counting camera. Globulin = 0; Albumin > 10. Labyrinthectomy performed at once. Cerebro-spinal fluid on 26th December opalescent, containing numerous polynuclear cells and pneumococci. Death early the following night from diffuse purulent basal meningitis.

## The Cerebro-spinal Fluid in Meningitis.

When the cerebro-spinal fluid obtained by lumbar puncture is turbid, when there is an abundance of polynuclear cells, and when bacteria are present, then of course all agree that we have before us an undoubted case of meningitis, indeed often a malignant form.

It must, however, be pointed out that in 70 per cent. of my cases leading to death from uncomplicated meningitis, the cerebro-spinal fluid obtained by lumbar puncture was sterile, although in all these cases bacteria were found post mortem when searched for. The conclusion must, therefore, be that the presence of bacteria is not an absolutely necessary finding in true meningitis. On the other hand, bacteria were found in about 10 per cent. of the cases which recovered, thus demonstrating that they are not an absolute *signum malum*.

As to the type of cells found in the cerebro-spinal fluid, they might be—broadly speaking—divided into two forms: polynuclear and mononuclear. In the vast majority of fatal

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cases of uncomplicated meningitis, the cells are, as is well known, exclusively or principally polynuclear. In a few fatal cases, however, mononuclear cells were found principally or solely, all these cases having a protracted subacute course much resembling tuberculous meningitis. Otherwise, the mononuclear form belongs to the benign cases. There are, nevertheless, as will be shown further on, many exceptions.

Finally, the pressure of the cerebro-spinal fluid is generally very high in malignant cases, 1000 mm. being the highest pressure measured in our cases. In benign cases it is sometimes not much beyond 180 mm., which I consider a normal pressure; frequently it is moderately increased. Exceptionally it is very high, the highest pressure measured in my clinical material being 950 mm. Increased pressure of the cerebro-spinal fluid is not of much importance in prognosis, and in benign cases it sometimes increases while the pleocytosis decreases (see Case II.).

As to the globulin- and sugar-tests I do not place much stress upon these modes of examination of the cerebro-spinal fluid in cases of otogenic meningitis. Their importance is much inferior to those mentioned above.

If I were to make a table—to which there are, however, many exceptions—showing the difference between malignant and benign meningitic cerebro-spinal fluid, it would be as follows:—

## *Meningitic Cerebro-spinal Fluid.*

	Malignant.	Benign.
Appearance . . . . .	Turbid	Clear or opalescent.
Type of Pleocytosis . . . . .	Polynuclear	Mononuclear.
Bacteria . . . . .	Present	Absent.
Pressure . . . . .	Very high	Moderately high.

Using lumbar puncture as a diagnostic measure, I should venture to define otogenic meningitis, from a clinical point of view, as an acute febrile brain disease, caused directly or indirectly by an acute or chronic middle-ear suppuration, exhibiting “diffuse” brain-symptoms and a cerebro-spinal fluid with pleocytosis, whether there are bacteria or not, and whether the type of the pleocytosis is polynuclear or mononuclear.

As to the number of cells which constitute a pleocytosis, opinions differ: Rehm, and others with him, considered 10 per c.mm., *i.e.*, 30 in Fuchs-Rosenthal’s counting camera, as the limit.



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Later on, Holzman lowered the figure to 5, considering 3 to 5 as being on the boundary line between normal and abnormal.

Both these authors, and many others, seem to base their experience especially on chronic diseases of the leptomeninges. Looking into the present clinical material, I consider even Holzman's figures too high. I should say that the existence of between 1 and 2 cells might be considered normal, adding, that in the vast majority of cerebro-spinal fluids there are no cells at all, if there is no intracranial lesion, and neither syphilis nor any other infectious disease present. When there are between 2 and 3 cells, I consider the case in question as suspicious. If there are 3 or more cells, and if there are "diffuse" brain symptoms present, I consider the diagnosis of meningitis as certain. Cells numbering up to 150 to 200 per cubic millimetre do not, as a rule, alter the clear appearance of the cerebro-spinal fluid, while an excess of this number makes it first opalescent, and, if the meningitis progresses, distinctly turbid. As soon as the fluid is not *perfectly* clear, I consider the pleocytosis high; 15 to 150 to 200 cells I should call moderate, and 3 to 15 slight pleocytosis.

As will be seen, great stress must be put upon the cell count when the cerebro-spinal fluid is clear. It should be added that this procedure ought to be done at once after the fluid is withdrawn by lumbar puncture.

If lumbar puncture is performed at intervals, we are also able to follow more accurately the progress or the decline of the meningitis, taking into consideration the characters of the cerebro-spinal fluid mentioned in the table above.

**Lumbar Puncture not Infallible.**—The importance of lumbar puncture as a diagnostic means is somewhat reduced by the circumstance that it shares one quality with all other clinical methods of examination: it is not infallible. It does not always act with the exactness of a water-gauge measuring the rise and the fall of the meningeal inflammation; the biological processes are too varied and complicated. Now and then, we see cases where there is a distinct contradiction between the benign character of the cerebro-spinal fluid and the grave state of the patient.

This happens, first of all, in the cases of complicated meningitis mentioned before, where the associated intracranial complication runs its fatal course while the meningeal changes decrease or disappear. In such cases it

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is really not the lumbar puncture which has given a wrong answer, it is our interpretation which is wrong.

It is quite another matter when in fatal cases of uncomplicated meningitis, the cerebro-spinal fluid assumes a less malignant or even a benign character *sub finem vitæ*. I have seen two of the latter cases, and have each time found at the post-mortem examination considerable plastic and thick exudate on the base of the brain. In these, it is easy to understand that the free communication of the cerebral fluid with the spinal fluid has been interrupted, and that the lumbar puncture principally indicates the state of the leptomeninges in the spinal canal.

This might also be caused by the presence of a brain-abscess, as will be demonstrated further on.

Now and then, one sees fatal cases of meningitis, uncomplicated or not, where one lumbar puncture shows a less malignant type of cerebro-spinal fluid than the puncture preceding it. In cases which recover, occasionally it happens that lumbar puncture shows the fluid of a less benign character than does the preceding puncture without aggravation of the symptoms.

### Benign Uncomplicated Meningitis.

(a) *Turbid Cerebro - spinal Fluid* ("Benign Purulent Meningitis").—The cases of uncomplicated meningitis ending in recovery afford the most ample opportunity of studying benign meningitis in its purest forms. They were, as will be seen from Table II., 38 in number, nearly half of them being children five to fourteen years of age. A little over 50 per cent. of the cases were caused by streptococcal otitis. This group may be divided into two: one in which the lumbar puncture gave turbid fluid, and the other in which it was perfectly clear.

The first group consists of 23 cases of which 3 were post-operative.

In all the 23 cases, with one exception, polynuclear cells were present in the cerebro-spinal fluid; they were predominant in 16 cases, while in 4 there was an equal number of polynuclear and mononuclear, and in 2 an excess of mononuclear cells. Bacteria were present four times (once in the exceptional case, where only mononuclear cells were found); in these cases pneumococci appeared twice, streptococci once; in one the forms could not be determined. The pressure varied from 130 to 800 mm.

The disease often started with shivering or sensation of

## Benign Forms of Otogenic Meningitis

cold, more frequently with vomiting, the latter symptom being only absent in two cases, while headache appeared in half of the patients. The temperature was never normal, but was in a few cases, only slightly elevated, while in about one-third of the cases, it was about  $104^{\circ}$  and beyond. The pulse was generally quick, as would be expected; five times there was a slow pulse. Drowsiness was often present, and twice the slow cerebration had developed into deep stupor. Rigidity of the neck was occasionally absent, as it is not infrequently also in fatal cases even up to death. The same was the case with Kernig's sign, while Babinski's sign was only present five times. Optic neuritis was observed in seven patients. In one case, where an abscess was suspected on account of the presence of deep stupor and slow pulse, the dura was opened, the brain explored, and a piece removed for microscopical examination; this revealed a considerable acute lepto-meningitis (but no encephalitis as expected) with fibrinous exudate on the surface.

These cases were all operated on except one, a child aged two, where operation was refused. The lumbar puncture yielded in this case a very turbid fluid containing an equal number of polynuclear and mononuclear cells, a slight optic neuritis being also present. This very rare and remarkable case shows that there may be a tendency to spontaneous recovery in some forms of otogenic meningitis.

There can, I think, be no doubt about the character of this type of benign meningitis, namely, that it is a genuine acute diffuse purulent meningitis. One can, of course, say that it is the initial stage of this disease, arrested in nearly all cases by an operation, but in several of them the objective signs and the grave state of the patient seemed to indicate that the initial stage had passed.

It is, therefore, not infrequently difficult to distinguish this form of benign meningitis from the malignant forms until twenty-four to thirty-six hours have elapsed after the operation has been performed; the subjective symptoms and the objective signs of meningitis generally clear up directly or soon after the operation, while a rapid progress of these is characteristic of fatal cases whether operated on or not. Fatal cases are often also recognised by the presence of septic symptoms, especially very high fever and albuminuria, the latter symptom being rare in benign cases. In fatal cases irregularity of the pulse also appears early.

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(b) *With Clear Cerebro-spinal Fluid* ("Collateral Meningitis").—The fifteen patients belonging to this group were still younger, the youngest being ten months, the oldest fifty years. Three cases were post-operative.

The cerebro-spinal fluid contained cells varying in number from 9 in Fuchs-Rosenthal's camera (where the figure must be divided by 3, *i.e.*, 3 per cubic millimetre) to 598. Five times mononuclear cells only were present, five times an excess of these, and three times an excess of polynuclear elements. In no case were bacteria found. The pressure was normal only twice; generally it was 300 to 500 mm., but in one case it was increased to 950 mm. (Case II.).

The temperature was normal only once; in the majority of cases it was slightly raised, and in five it was about  $104^{\circ}$ . The pulse was frequently quickened, as might be expected; twice it was noticed to be slow. Shivering or chilly sensations were reported five times. Vomiting was a constant initial symptom, and often appeared later in the course of the disease, even when the patient otherwise did well. Headache was less frequent in this group, and was not particularly prominent in cases with high pressure of the cerebro-spinal fluid. Drowsiness, which I consider a symptom of great diagnostic value, but which is often overlooked when slight (as it often is in these cases), was very frequent; in only one case was stupor present. Rigidity of neck only appeared eleven times, being sometimes so slight that this symptom was not discovered unless the head of the patient was bent very much forward. Kernig's sign only appeared five times, while Babinski's sign, sometimes only on the opposite side, was present six times. Five of the patients had optic neuritis; paresis of the abducent nerve was found twice. The recovery often took a long time, the pleocytosis disappearing very slowly, and some of the cases had a remarkably protracted subacute course, as seen from Case II.

CASE II., No. 11/1922.—Female, aged 17. Admitted 1st November 1921. Discharged 7th January 1922.

Acute inflammation of left middle-ear for four days. Ten hours before admission, shivering, repeated vomiting and giddiness. Temperature  $101.5^{\circ}$ ; pulse, 108. Drowsiness and Kernig's sign present. C.S.F. clear, pressure 400, cells  $\frac{79}{-}$ , exclusively mononuclear. Simple mastoid operation performed at once. 2nd November, Temperature  $100.4^{\circ}$ ; pulse, 92. Headache and photophobia present. 3rd November, Increased drowsiness. Temperature,  $100.4^{\circ}$ ; pulse,

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100. C.S.F.  $\frac{10}{3}$  cells, pressure 300. 4th November, Temperature,  $99.7^{\circ}$ ; pulse, 72. Double vision from paresis of right abducent nerve. No Kernig's sign. 5th November, Temperature,  $99.5^{\circ}$ ; pulse, 52. Babinski's sign and rigidity of neck present. C.S.F. cells  $\frac{14}{3}$ , pressure 650. 7th November, Temperature  $100.5^{\circ}$ ; pulse, 68. Slight optic neuritis, 9th November, Temperature  $99.9^{\circ}$ ; pulse, 60. Rigidity of neck and Babinski's sign disappeared, instead of which brain-nystagmus was present. C.S.F.  $\frac{14}{3}$  cells; pressure 700. From 9-15th November all brain-symptoms disappeared, except the right-sided abducent paresis and the optic neuritis which had increased. Temperature normal; pulse, 56-64. 16th November, Headache and vomiting. C.F.S.  $\frac{2}{3}$ , pressure 950. From 17th-21st November, Headache and vomiting ceased. Paresis of right abducent nerve less and present also on the left side; increasing optic neuritis. Temperature normal; pulse 50-84, irregular. 22nd November, Temperature normal; pulse, 88, regular. C.S.F.  $\frac{2}{3}$ , pressure 650. 23rd November to 7th January 1922. The patient felt on the whole well, but now and then nausea and headache appeared. Temperature became normal, pulse varying from 80-92. Optic neuritis remained stationary, when it had reached the height of four diopters on the right side and three on the left side, and showed only slight decrease when the patient was examined on 6th May—six months after it had first appeared. When examined on this day there still remained slight paresis of the left abducent nerve and the pressure of the cerebro-spinal fluid was 600. The cells which had disappeared entirely on the 19th of December were present only in the number of  $\frac{2}{3}$ . The patient felt well but had a slight headache now and then.

The question naturally arises: Is it possible that such a small number of cells in the cerebro-spinal fluid as  $\frac{2}{3}$  in Fuchs-Rosenthal's camera, *i.e.*, 3 per cubic millimetre, indicates the presence of meningitis? This must, I think, be answered in the affirmative, if we consider the following example:—

CASE III., No. 512/1921.—Male, aged 10. Admitted 7th November 1921. Discharged 7th December 1921.

Chronic middle-ear suppuration on the left side. Initial shivering and vomiting two days before admission. Temperature  $100.5^{\circ}$ , pulse 88. Slight drowsiness, otherwise no objective signs of meningitis present except optic neuritis and paresis of the right abducent nerve. C.S.F. perfectly clear, pressure 600,  $\frac{6}{3}$  mononuclear cells ( $=2$ ) per cubic millimeter. Radical operation performed at once, by which a considerable cholesteatomatous osteitis was found with fistula on the external semicircular canal. Two days later C.S.F. contained  $\frac{3}{3}$  ( $=3$ ) cells per cubic millimetre, some polynuclear forms also being present;

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pressure 750. On the 10th November there was vomiting, and Kernig's sign was present. 11th November, C.S.F., pressure 600 mm.,  $\frac{9}{10}$  exclusively mononuclear cells. 19th November, C.S.F.  $\frac{5}{10}$  exclusively mononuclear cells. Slow recovery, Kernig's sign still present on the 26th November. On 4th January 1922 optic neuritis still present.

Moreover, there is a small series of cases of fatal meningitis which started in exactly the same way as Case III. In cases, especially of acute suppurative labyrinthitis with clear cerebro-spinal fluid and very slight pleocytosis, our experience in the hospital has been, that if labyrinthectomy is performed on the very first warning of the slight pleocytosis, the patients are frequently saved, while disregard to this warning in a great majority of cases leads to the death of the patient from meningitis. In no other class of case is it so important to watch the cerebro-spinal fluid, if necessary, by repeated lumbar puncture every twelve to forty-eight hours.

The question whether cases with clear cerebro-spinal fluid and slight pleocytosis should be classified as meningitis or not is, as will be seen from the above, not an academic one but one of eminent practical importance.

Whether the meningitis in such cases is diffuse or of a local nature, one cannot of course decide with certainty, but I presume it is generally of a more diffuse character. It is often difficult to distinguish—even at a post-mortem examination—between a “local” and a “diffuse” meningitis, and most fatal cases of meningitis start surely as “local” inflammation. I think, therefore, that it would be better to distinguish between a “circumscribed” meningitis, meaning thereby a process where there is soldering of the membranes in the circumference, and a “diffusing” meningitis, whether localised to small or large areas, without these adhesions being present and therefore with tendency to progress.

On account of the uncertainty mentioned, I have for several years designated the benign forms of otogenic meningitis with clear cerebro-spinal fluid by the name of “Collateral Meningitis.” I consider this name better than the many names used, such as *meningitis serosa*, *m. localis*, *m. sympathetica*, “meningeal irritation,” as one avoids using a name which involves a distinct interpretation of the character or of the extension of the disease. Further, “collateral meningitis” expresses the dependence of the process upon a primary focus and also its

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tendency, like other collateral inflammations, to recede when the primary disease either is cured by operation or—if it is a phlebitis of the sigmoid sinus or a brain-abscess—passes into a subacute state.

In cases where there are diffuse brain-symptoms and where the cerebro-spinal fluid either does not contain any cells or only one or two, I think one might use the name “meningismus.”

The term “local meningitis” ought to be restricted to those cases where there is slight pleocytosis and unilateral headache without any diffuse brain symptoms or fever, *i.e.*, a “circumscribed meningitis.” Such patients ought to be operated on early, for sometimes a diffuse meningitis suddenly sets in. On the other hand, there is also risk connected with the operation, because this sometimes acts like an injury, causing post-operative fatal meningitis. We are, therefore, in such cases—as in most other surgical cases—in a position in which there is risk both in operating or in not operating; in each individual case one must decide in which direction the risk is smallest.

## Benign Complicated Meningitis.

(a) *With Phlebitis of the Sigmoid Sinus.*—This group embraces 16 cases of recovery, of which 8 exhibited clear and 8 turbid cerebro-spinal fluid. The pleocytosis was never under  $\frac{2}{3} \cdot 1 = 7$  cells per cubic millimetre; on the other hand, the fluid never had such a turbid appearance as in the majority of patients with uncomplicated benign meningitis. The predominant form of cells was polynuclear. Bacteria were only found once, which is rather strange, as I have seen a small series of cases of uncomplicated phlebitis of the sigmoid sinus with a cerebro-spinal fluid containing a very large quantity of bacteria but no cells and with no signs of meningitis.

The diffuse brain symptoms of meningitis were often covered by the symptoms of the phlebitis. Optic neuritis only appeared twice.

In one case (with slightly turbid cerebro-spinal fluid) microscopic examination of a piece of brain tissue excised during operation revealed the existence of considerable inflammation of the cerebellar leptomeninges.

In all cases, the inflammation of the sigmoid sinus and of the leptomeninges seemed to have started simultaneously.

In several cases, where there was a combination of fatal

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sinus phlebitis and meningitis the latter disease showed a benign character, being either very slight or disappearing entirely before death. Terminal meningitis is, on the whole, not a frequent cause of death in phlebitis of the sigmoid sinus.

One single case deserves mentioning, inasmuch as the patient died one year later from uncomplicated meningitis originating from the other ear. The diffuse brain symptoms were almost exactly alike on each occasion.

In two cases in which collateral meningitis complicated fatal sinus phlebitis, the post-mortem examination showed no macroscopic signs of leptomeningitis, while the microscope revealed the existence of this complication.

(b) *With Brain Abscess*.—In these cases the meningitis is generally secondary, and its symptoms are usually covered by the symptoms of the brain-abscess, but now and then they assume a more independent character.

The cerebro-spinal fluid obtained by lumbar puncture is generally of the benign character described above, and only once contained bacteria (streptococci). This is often the case also in patients who die with brain abscess, even if death is caused by terminal meningitis. The feature, however, which is most characteristic of brain abscess associated with meningitis—and this is nearly always the case, as pointed out nearly thirty years ago by Sir William Macewen, to whom brain-surgery is so much indebted—is that the cerebro-spinal fluid changes very much from one lumbar puncture to another. It becomes now turbid, now clear; sometimes the pleocytosis is of a mononuclear, sometimes of a polynuclear type during the course of the disease in the same patient. These facts are, I presume, due to two circumstances. The first is that the encephalitis causing brain abscess does not develop continually, but in small spurts, during which the secondary meningitic process is more active, and therefore produces more polynuclear cells. The other circumstance is that a brain abscess—as can be seen by many post-mortem examinations—often causes an augmentation of the volume of the brain which presses down the medulla oblongata into the upper part of the spinal canal, thus impairing the free communication between the cerebral and spinal subarachnoid spaces. The lumbar puncture represents then, as mentioned before, the state of the spinal rather than of the cerebral leptomeninges.



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Finally, it must be stated that a piece of a convolution of the brain was removed in a patient who recovered from acute encephalitis, in whom the cerebro-spinal fluid was very turbid, containing an excess of polynuclear cells and streptococci; the microscopical examination only revealed the existence of encephalitis. Although in two other patients who died from meningitis (the diagnosis being confirmed at the post-mortem examination) a similar microscopical examination *in vivo* also gave no evidence of meningeal inflammation, I think still that the above case might raise the doubt whether a brain abscess or a suppurative encephalitis may not give the cerebro-spinal fluid a "meningitic" character when it is situated close to the surface of the brain or to the ventricles. *Qui vivra verra!*

### Operative Measures.

I have, in the beginning of this paper, already touched upon some more remote causes which favour the arrest of the progress of meningitis. But they are, of course, of secondary importance. A very important factor is, as I am sure we are all fully convinced, the *early* elimination of the primary focus, whether this is in the middle ear alone, in the petrous bone, or in the labyrinth.

But in many cases even an operation performed as early as possible is not able to avert the fatal course of the disease. My experience has led me to believe that there are—from a clinical point of view—really two forms of meningitis. In the one, and by far the more frequent, the inflammatory process in the leptomeninges spreads like the explosion of a barrel of gunpowder ignited by a spark, and any operative measure is useless, the disease showing a very rapid progress, which is a prominent clinical feature of great diagnostic value. In a minority of cases—say one-third—the spark, *i.e.*, the inflammatory products from the primary focus, is not able to cause the explosion before the fire has been nourished for some time from the focus. If, in such cases, the latter is eliminated, the further feeding by inflammatory products ceases, and the nascent inflammation of the meninges recedes.

This idea has, in any case, been my principal guide during the last decade in the operative treatment of otogenic meningitis. For seven years previously I tried, in vain, all sorts of operations supplementary to the elimination of the primary focus such as

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opening of the subarachnoid space and draining the cavity. I consider them not only as useless but even as injurious, and my impression is that my results are better now than before. My experience has made me believe that if one does not stop the development of a meningitis by elimination of the primary focus, nothing can stop it.

My view is especially corroborated by examining the results of the operative treatment of labyrinthine meningitis. Although this form of meningitis is particularly serious, I have seen one recovery after another without any further operation than mastoid operation and labyrinthectomy, performing this operation when the function of the labyrinth is extinguished or nearly extinguished, as soon as there are about 9 cells or more in Fuchs-Rosenthal's camera, *i.e.*, 3 per cubic millimetre.

As, however, craniotomy involves no danger when the dura mater is not opened, I regularly perform this operation in order to examine minutely the state of the dura mater. If the membrane shows no signs of a deeper going disease, I go no further when there is no suspicion of subdural or cerebral abscess.

While formerly I always performed the radical mastoid operation in acute cases in order to be able to examine also the labyrinth minutely, I now only perform the simple mastoid operation in acute cases, as we possess means of testing accurately the function of the labyrinth, fistula of the labyrinth being exceedingly rare in acute suppuration.

Repeated lumbar punctures I consider not only very useful as a means of following the decrease or increase of the meningeal process, but I believe they have a beneficial influence, especially when the pressure of the cerebro-spinal fluid is very high or the patient is suffering from severe headache or nausea.

## THE RELATIONS OF THE OPTIC AND VIDIAN NERVES TO THE SPHENOIDAL SINUS.\*

By Dr GAVIN YOUNG, Western Infirmary, Glasgow.

I HAVE gladly to acknowledge help received from the work previously done in this department of the specialty by Onodi, Skillern, my late chief Dr Logan Turner, my present chief Dr W. S. Syme, and others.

**Material.**—Through the kindness of Professor Robert Muir I have examined, by dissection, the sphenoidal sinuses in thirty subjects in the post-mortem room of the Western Infirmary. As I wish to pursue the investigation further, I do not propose to submit all the details of the results up to this point. The specimens were obtained, after removal of the skull cap and brain, by chiselling out a block of tissue from the anterior boundary of the foramen magnum to the crista galli of the ethmoid. The cases were not specially chosen, the material being provided by whatever bodies were subjected to post-mortem examination.

The ages ranged from 12 to 76, all being adults save two, boys of 12 and 16 respectively, and in neither of these subjects were the sphenoidal sinuses fully developed, the cellular spaces in the younger of the two being mere pits in the body of the sphenoid. The cause of death was not, so far as one could see, directly associated with the condition of the sphenoidal sinuses, save in one instance, where the patient had died of non-otitic meningitis, in a general surgical ward. In this case, I found pus in both sphenoidal sinuses and a hiatus in the bony wall of the left sinus, but with no gross lesion apparent in the dura mater. In passing, and with no desire to provoke controversy, I might note that, with regard to the contents of the various sinuses, in 8 cases, 26 per cent. of the whole, no pus was present in any of the cavities. Pus was found in one or other of both maxillary antra in 13 cases, 43 per cent., while one or both sphenoidal sinuses contained pus in 17 cases, 56 per cent. In many of them the sinus mucosa was definitely thickened; in some instances it was polypoid. However, the total number of cases is too small to generalise upon, and, in any case, the

\* Paper read at the Extraordinary Meeting of the Scottish Society of Otolaryngology, 28th July 1922.

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moment is not auspicious to consider the question of whether 43 per cent. of the population of the West of Scotland have antral disease and 56 per cent. sphenoidal disease.

**Anatomical Data**—I come now to the anatomical facts presented by these specimens. The normal relation of the posterior ethmoidal cell to the sphenoidal sinus is, that the posterior wall of the ethmoid lies on the antero-lateral aspect of the sphenoidal sinus. This relation varies, however, with the amount of bone absorption that has taken place to form the cells. In the sclerotic type, the posterior ethmoidal cell lies quite laterally to the sphenoidal sinus. As the walls of both cells become absorbed, and the cells enlarge, the sphenoidal sinus creeps out laterally behind the posterior ethmoidal cell, while the latter extends inwards towards the middle line. Many exceptions to this rule, however, are found. In one specimen, the right and left posterior ethmoidal cells meet in the middle line, lying quite above the sphenoidal sinuses. In another, while one side is nearly normal, on the other side, the posterior ethmoidal cell takes up the position of the sphenoidal sinus, the latter lying below and partly lateral to the former. In a third case, an extra posterior ethmoidal cell was found in the inter-sphenoidal septum. It is necessary to remind you of these facts on account of the relation to the sinuses of the canal containing the optic nerve. This nerve is in close relation to the postero-lateral angle of the post-nasal sinuses, near the roof at the posterior end of the orbit. It will be noticed then that in the sclerotic type of cranium the nerve is related, not to the sphenoidal sinus at all, but to the posterior ethmoidal cell which lies more laterally. This relationship is changed in the various types, according to the amount of bone absorption which has taken place until, in the thin-walled sinuses, the canal of the nerve is in relation to the sphenoidal sinus, posteriorly to the posterior ethmoidal cell.

It is a matter of common knowledge that the optic nerve is in close relation to the sphenoidal sinus. How close this relationship is, is a matter that may not be realised by all. As a practical demonstration of it, I have passed a horse-hair suture round the sinuses, following the course of the canal back to the position of the optic chiasma. In 27 cases, 90 per cent., the bone between the nerve and the sphenoidal sinus, in at least part of its course, is so thin that the suture can easily be seen through it. The wall is practically transparent. In 4

## Relations of the Optic and Vidian Nerves

specimens, 13 per cent., there is a hiatus in the bone covering the nerve. In one of these specimens, so much absorption had taken place, that it is no exaggeration to say that there was more hiatus than bone in the postero-superior and lateral walls of the sinus.

With regard to the relative sizes of the sphenoidal sinuses, in many cases the inter-sphenoidal septum was markedly deflected from the middle line, making one sinus greater than the other. The difference was sometimes so marked that the larger sinus was found to be in relation to the heterolateral optic nerve or cavernous sinus, or both. The actual figures showed that in 13 cases, 46 per cent., the sphenoidal sinus of one side was related to the heterolateral cavernous sinus, and in 9 cases, 30 per cent., the sphenoidal sinus was in relation to the heterolateral optic nerve. The sclerotic type was in a very small minority, 10 per cent. being in this category; the walls in the remaining specimens were very thin. In the latter 27 cases, a striking feature was the bulging down from the roof of the sinus of the fossa containing the pituitary body. This formed a bulge downwards of usually about 5 mm. to 8 mm. of transparent, easily injured bone. In 7 cases, 23 per cent., the walls of the optic nerve canal bulged into the sinus, in one or two cases making almost a bony tunnel, although in no case was the tunnel complete. Foramina in the bone, giving passage to blood vessels, were very commonly found in the lateral wall of the ethmoidal and sphenoidal masses, the boundary between the orbit and the sinuses. They varied greatly in size and position, although one fair-sized foramen was very constantly present in the neighbourhood of the spheeno-ethmoidal partition. Numerous blood vessels were noted occupying these foramina as the periosteum was being stripped from the mesial wall of the orbit. One or both sphenoidal sinuses were loculated, in 53 per cent. of cases, by well-formed septa. The septa were never complete, and usually ran radially from the centre of the sinus.

**Clinical Considerations.**—The clinical application of these facts comes under two headings:—

1. Optic neuritis due to infection spreading from diseased posterior sinuses.

It is quite apparent how this infection takes place. A virulent type might easily spread through bone of the thinness of that found in the majority of the specimens. If this be

## Gavin Young

debated, it will be remembered that there are actually hiatuses in the bony walls, and in addition to this, the numerous blood vessels connecting the orbit with the sinuses must constitute a considerable danger.

2. Some points arise with regard to the surgical treatment of the sphenoidal sinus. Many operators feel that when they are able to press the end of the instrument used against the dense posterior wall of the sinus, they are sure of being in the sphenoidal sinus. In certain of these specimens, no dense bone would be encountered by the instrument until the vertex of the skull was reached. Another point of danger is the bulging down of the pituitary fossa already referred to, with its very thin protective covering of bone; and lastly, the optic nerve is often most inadequately protected from a wandering curette. Taking these dangers into consideration, it will be recognised that curettage of the sphenoidal sinus is not only recklessly dangerous, but, on account of the septa in so many of the sinuses, it is very likely to be ineffective in result.

In my opinion, the technique of draining these sinuses should be simplified as much as possible. After the preliminary steps considered requisite by each individual operator to clear the way to the sinus, the whole anterior wall of the sinus should be removed, and the operator should rest content with this amount of surgery. It is obviously impossible to remove thoroughly all the diseased mucosa from the sinus, as can be done so satisfactorily in the maxillary sinus operation. I am satisfied also, that when optic neuritis is the indication for operation, both sides should be operated upon, no matter on what side the neuritis is, in view of the large percentage of cases, viz., 30 per cent. in this series, in which the sphenoidal sinus is in relation to the heterolateral optic nerve. As a method of approaching the cavernous sinus in cases of thrombosis, the sphenoidal sinus route might be more practicable than that sometimes followed as in the operation upon the Gasserian ganglion; by removing the postero-superior part of the nasal septum, the anterior wall of both sphenoidal sinuses, and the inter-sphenoidal septum if necessary, the lateral wall of the sphenoidal sinus can be reached and removed.

A few words are necessary in regard to the Vidian nerve. The nerve runs forward under the floor of the sphenoidal sinus, to supply the sphenopalatine ganglion. The latter structure lies at the anterior opening of the sphenomaxillary fossa which

## Relations of the Optic and Vidian Nerves

opens just below the anterior wall of the sphenoidal sinus. In 50 per cent. of the cases, the bone between the nerve and the sinus was transparent, *i.e.*, the horse-hair which was passed through the canal was quite apparent in the sinus. In 3 cases, 10 per cent., there was a hiatus in the roof of the canal. In one of these the nerve ran free in the sinus for half an inch covered only by mucosa. It is known that optic neuritis occurs as the result of an extension of nasal sinus disease. It has been noted by Syme and others, that neuritis of the Vidian nerve may occur, and that it may possibly give rise to pain in the ear. The Vidian nerve is connected by the great superficial petrosal nerve with the geniculate ganglion of the facial nerve in the Aqueduct of Fallopius, and the facial nerve in turn is connected by two branches with the auditory nerve. Given a neuritis of the Vidian nerve, it is not too much to conceive an extension to the auditory nerve. It is suggested, then, that a neuritis caused in this way might be the origin of some of these obscure cases presenting the Menière's syndrome, which are so intractable to treatment. There is not now time to discuss this further, but I hope that more work may be done in this direction in the near future.

# STATISTICAL TABLES FOR THE YEAR 1921

*From the Ear and Throat Department, Royal Infirmary, Edinburgh;  
under the charge of A. Logan Turner, M.D., F.R.C.S.E.*

By DONALD WATSON, F.R.C.S. Eng.

## AFFECTIONS OF THE NOSE (1277).

### I. The External Nose and Nasal Vestibule.

Nasal Deformity . . . . .	2
Fracture of Nasal Bones . . . . .	4
Injury to Nose . . . . .	7
Dermatitis of Vestibule . . . . .	57
Furuncle of Vestibule . . . . .	7
Abscess of Vestibule . . . . .	2
Lupus of External Nose . . . . .	2
Gumma of External Nose . . . . .	1
Sebaceous Adenoma . . . . .	1
Rodent Ulcer . . . . .	1
Rhinophyma . . . . .	2
Erysipelas . . . . .	1
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### II. The Nasal Cavities.

Foreign Bodies in Nose . . . . .	6
Acute, Subacute, and Chronic Rhinitis . . . . .	117
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Synechia between Septum and Turbinal . . . . .	2
Nasal Polypi and Polypoid Middle Turbinals . . . . .	94
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"    (Fœtid) . . . . .	22
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Nasal Diphtheria . . . . .	1
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"    "    Left . . . . .	184
"    "    Irregular . . . . .	82
Perforation of Septum . . . . .	6
Hæmatoma and Abscess of Septum . . . . .	2
Bleeding Polypus of Septum . . . . .	2
Tubercular Disease of Septum . . . . .	1
Perichondritis " . . . . .	1
Papilloma of Septum . . . . .	1
Fibroma " . . . . .	1
Abscess " . . . . .	2



# Statistical Tables for the Year 1921

Lupus of Nasal Mucous Membrane . . . . .	5
Syphilis . . . . .	8
Cyst of Floor of Nose (Bilateral) . . . . .	1
Malignant Tumours :—	
Sarcoma (Myeloid) . . . . .	1
Sarcomatous Degeneration of Myxo-fibroma . . . . .	1
Nasal Neurosis (including Asthma) . . . . .	81
Anosmia . . . . .	3
Parosmia . . . . .	1
Spheno-palatine Ganglion Neurosis . . . . .	1
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## THE NASAL ACCESSORY SINUSES (84).

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" Suppuration . . . . .	6
Chronic Antral Catarrh . . . . .	2
" Suppuration . . . . .	32
Acute Ethmoidal Suppuration . . . . .	4
Chronic " . . . . .	9
" Antro-Ethmoidal Suppuration . . . . .	7
Acute Frontal Sinus Suppuration . . . . .	1
Chronic Frontal and Antral Suppuration . . . . .	1
" , Antral, and Ethmoidal Suppuration . . . . .	1
Chronic Sphenoidal Sinus Suppuration . . . . .	1
Pansinusitis . . . . .	1
Naso-antral (Choanal) Polypi . . . . .	7
Dental Cyst, invading Antrum . . . . .	3
Osteoma of Frontal Sinus (left) . . . . .	1
Mucocele of " . . . . .	1
Malignant Tumours :—	
Squamous Epithelioma of R. Antrum . . . . .	2
" " L. Ethmoid and Orbit . . . . .	1
" " R. Antrum and Orbit . . . . .	1
Sarcoma of L. Antrum and Orbit . . . . .	1
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## DISEASES OF NASO-PHARYNX, PHARYNX, AND FAUCES (1528).

Congenital Atresia of Choanæ . . . . .	1
Adenoids and Enlarged Tonsils . . . . .	1350
Acute Tonsillitis . . . . .	25
Vincent's Angina . . . . .	1
Peritonsillar Abscess . . . . .	17
Cyst of Tonsil . . . . .	1
Acute Pharyngitis . . . . .	10
Chronic Catarrhal Pharyngitis (including Granular) . . . . .	45
Pharyngitis Sicca . . . . .	15
Keratositis Pharyngis . . . . .	3

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Hypertrophy of Lingual Tonsil . . . . .	4
Nasopharyngeal Catarrh . . . . .	2
Tubercular Disease of Pharynx . . . . .	1
Secondary Syphilis of Fauces and Pharynx . . . . .	8
Tertiary                   "                   " . . . . .	14
Malignant Tumours of Fauces and Pharynx . . . . .	10
Foreign Bodies in Fauces and Pharynx . . . . .	2
Fibroma of Nasopharynx . . . . .	2
Sensory Neurosis . . . . .	17
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Acute Glossitis . . . . .	1
Tertiary Syphilis of Mouth, Tongue, and Palate . . . . .	8
Malignant Disease of Tongue and Palate . . . . .	3
Injury to Mouth and Palate . . . . .	1
Salivary Calculus . . . . .	1
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## AFFECTIONS OF THE LARYNX AND TRACHEA (136).

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### II. Chronic.

Chronic Catarrhal Laryngitis . . . . .	22
Laryngitis Sicca . . . . .	5
Vocal Nodules . . . . .	4
Tubercular Disease of Larynx . . . . .	12
Syphilitic Disease           " . . . . .	8
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### III. Tumours.

Simple :—	
Papilloma . . . . .	3
Fibroma . . . . .	1
Adenoma . . . . .	1
Malignant :—	
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# Statistical Tables for the Year 1921

## IV. Affections of Laryngeal Nerves.

Functional Aphonia . . . . .	11
Abductor Paralysis of L.V.C. . . . .	1
"    "    R.V.C. . . . .	2
Recurrent Paralysis of L.V.C. . . . .	6
"    "    R.V.C. . . . .	1
Bilateral Abductor Paralysis . . . . .	2
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## V. Miscellaneous.

Congenital Laryngeal Stridor . . . . .	1
Stenosis of Larynx . . . . .	1
Subglottic Hypertrophy . . . . .	1
Subglottic (Edema of Larynx (unknown cause)	2
Injury to Larynx (cut-throat) . . . . .	2
Inspiratory Spasm following Diphtheria . . . . .	1
Simple and Exophthalmic Goitre . . . . .	28
Purulent Tracheitis . . . . .	2
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## AFFECTIONS OF LARYNGEAL-PHARYNX AND ŒSOPHAGUS (37).

Malignant Stricture of Laryngeal-pharynx (Squamous Epithelioma) .	3
Cardiospasm . . . . .	3
Functional Dysphagia (shell shock) . . . . .	2
Spasmodic Stricture (upper end) . . . . .	3
Traumatic " . . . . .	5
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Cervical . . . . .	2
Intra-thoracic . . . . .	9
Foreign Bodies . . . . .	9
Hæmorrhage from Œsophagus . . . . .	1
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## AFFECTIONS OF THE EAR (1803).

### I The External Ear.

Injuries to External Ear . . . . .	5
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Furunculosis . . . . .	77
Otitis Externa . . . . .	73
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Erysipelas of External Ear . . . . .	1
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Sebaceous Cyst of Auricle . . . . .	2
Perichondritis „ . . . . .	1
Herpes . . . . .	1
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Acute Suppurative Otitis Media :—	
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Right. . . . .	148
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Bilateral . . . . .	85
Sequelæ of Chronic Suppurative Otitis Media :—	
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Left . . . . .	103
Bilateral . . . . .	72
Acute Middle Ear Suppuration with Mastoid Complication :—	
Right. . . . .	30
Left . . . . .	26
Bilateral . . . . .	1
Chronic Middle Ear Suppuration with Mastoid Complication :—	
Right. . . . .	36
Left . . . . .	38
Bilateral . . . . .	1
Tubercular Middle Ear Suppuration :—	
Right. . . . .	1
Left . . . . .	3
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Congenital (including deaf-mutism) . . . . .	3
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# Statistical Tables for the Year 1921

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Chronic Latent " " . . . . .	3
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Congenital Syphilis . . . . .	6
Acquired Syphilis . . . . .	7
Nerve Deafness due to Toxæmia (including specific fevers) . . . . .	6
Cerebello Pontine Tumour and Tumour of Eighth Nerve . . . . .	2
Suspected Cerebellar Lesion . . . . .	1
Unknown Causes of Nerve Deafness . . . . .	56
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## INTRACRANIAL COMPLICATIONS OF SUPPURATIVE OTITIS MEDIA.

*Three* cases complicating Acute Suppurative Otitis Media :—

Extra-dural Abscess in Middle and Posterior Fossæ (Right ear) . . . . .	1
Extra-dural Abscess and Cerebellar Abscess (Left ear) . . . . .	1
Jugular Bulb Thrombosis, Lepto-meningitis, and Acute Septicæmia (Left ear) . . . . .	1

Recoveries : 1.—Extra-dural Abscess in Middle and Posterior Fossæ.

Deaths : 2.—The Cerebellar Abscess and Jugular Bulb Thrombosis Cases.

*Three* cases complicating Chronic Suppurative Otitis Media :—

Peri-sinus Abscess and Cerebellar Abscess (Right and Left ears) . . . . .	2
Temporo-sphenoidal Abscess and Lepto-meningitis (Right ear) . . . . .	1

Recoveries : 1.—Peri-sinus and Cerebellar Abscess.

Deaths : 2.—Cerebellar and Temporo-sphenoidal Abscess Cases.

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## MISCELLANEOUS CASES (183).

These include cases sent from other wards in the hospital with negative findings, enlarged cervical glands, skin diseases, headaches of unknown origin, eye cases, etc. . . . . 183

## TABLE OF OPERATIONS

### The Nose.

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Abscess and Hæmatoma of Septum . . . . .	1

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Submucous Resection of Septum . . . . .	199
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Operation for Choanal Atresia . . . . .	1
Foreign Bodies removed from Nose . . . . .	5
Intra-nasal Dacryocystitis (West's Operation) . . . . .	6
Injection of Spheno-palatine Ganglion (Sluder) . . . . .	1
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## Operations on Nasal Accessory Sinuses.

Proof Puncture of Antrum . . . . .	121
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Radical Operation on Antrum (including naso-antral Polypi) . . . . .	48
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Radical " " " " . . . . .	1
Intra-nasal Operation on Ethmoid Cells . . . . .	16
" " Sphenoid . . . . .	1
Osteoma of Frontal Sinus removed . . . . .	1
Rouge Operation . . . . .	2
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## Operations on Mouth and Pharynx.

Tonsils and Adenoids removed (Guillotine and Curette) . . . . .	1200
Tonsils dissected out (Scissors and Snare) . . . . .	61
Peritonsillar Abscess opened . . . . .	18
Retropharyngeal Abscess opened . . . . .	1
Papilloma of Palate removed . . . . .	1
" of Uvula " " . . . . .	2
Tissue removed from Nasopharynx (for diagnosis) . . . . .	7
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## Operations on Larynx, Trachea, and Œsophagus.

Direct Laryngoscopy . . . . .	7
Suspension Laryngoscopy :—	
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Simple Tumour of Vocal Cords . . . . .	7
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Dilatation of Stenosis . . . . .	19
Œsophagoscopy :—	
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Removal of Foreign Bodies . . . . .	11
Bronchoscopy . . . . .	5
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# Statistical Tables for the Year 1921

## Operations on the Ear.

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Paracentesis . . . . .	35
Sebaceous Cyst of Auricle . . . . .	4
Aural Polypi curetted . . . . .	26
Glandular Abscess over Mastoid . . . . .	10
Foreign Bodies removed . . . . .	8
Plastic Operations . . . . .	10
Schwartz Operation on Mastoid . . . . .	64
Modified Radical Operation on Mastoid . . . . .	15
Radical Operation on Mastoid . . . . .	62
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Extra-dural Peri-sinus Abscess . . . . .	1
Extra-dural Abscess in Middle and Posterior Fossæ . . . . .	1
Cerebellar Abscess opened . . . . .	3
Temporo-sphenoidal Abscess opened . . . . .	1
Internal Jugular Vein ligatured . . . . .	2
Jugular Bulb Operation . . . . .	1
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## Anæsthetics Administered.

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Number of new patients attending the Department . . . . .	3552

# SOCIETIES' PROCEEDINGS

## SECTION OF LARYNGOLOGY—BRITISH MEDICAL ASSOCIATION, GLASGOW.

July 1922.

*President*—Dr JOHN MACINTYRE.

### SYMPTOMS AND DIAGNOSIS OF DISEASES OF THE ŒSOPHAGUS—ABSTRACT.

**1. Affections of the Superior Opening of the Œsophagus**  
—D. R. PATERSON, M.D., C.M. (Cardiff).—The semeiology of œsophageal disease consists essentially of dysphagia and regurgitation of food. The onset of dysphagia may be gradual, commencing with difficulty in passing solids, extending later to semi-solids, then liquids; when the lesion is high up, at the orifice of the canal, fits of coughing are apt to accompany any attempts to swallow, food finding its way into the air-passage. On the other hand, the appearance of dysphagia may be sudden, and is often related to spasm. It is not unusual, in early malignant disease, to find an element of spasm which is largely responsible for the dysphagia.

In certain states, *i.e.*, anorexia and neurosis, there may be disinclination, amounting to a declared inability, to swallow, but, as a rule, there is not much difficulty in their differentiation. On the other hand, dysphagia may not be well marked even with malignant disease, and secondary glands, or a secondary infiltration of the thyroid, may be surgically dealt with while the original focus remains undetected.

Additional symptoms of less value sometimes present are—Pain in the region of the thyroid or in the ear, and salivation. This last may be present in cases of trauma, impacted foreign body, or in malignant disease. Careful palpation of the neck and region of the larynx, and internal palpation with the finger should be carried out in every case; disease of the laryngeal-pharynx is within reach of the finger. The laryngeal mirror should also be used and may establish the diagnosis at once. X-ray examination is invaluable for information as to how the food bolus behaves in the mouth of the gullet, and a malignant tumour may be well defined by particles of bismuth adhering to the fissures and erosions. The bougie for diagnostic purposes must be condemned, but the most precise information of all is obtained from endoscopy, and, in some cases, suspension laryngoscopy.

Spasm of the upper end of the œsophagus may be secondary to a small local lesion, such as an ulcer or the impaction of a fish bone; it may be due to hydrophobia, tetanus, or certain poisons; it may be



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associated with malignant disease at the other end of the œsophagus; it may also be a manifestation of hysteria.

Of greater importance are cases of œsophageal spasm occurring in women of middle age; a long history is frequent and characteristic. Passage of a tube may relieve it for a time. On the other hand the onset may be sudden, and associated with some severe illness. This condition is very frequently associated with changes in the buccal and pharyngeal mucosa. The so-called chronic glossitis, with smooth, glossy upper surface of the tongue, with whitish patches and dryness, is only part of a condition which involves also the laryngeal-pharynx. In the latter situation, as in the tongue, malignant disease may later appear. This clinical type of spasmodic dysphagia should be recognised as a separate entity. On endoscopy the tissues are rigid and the thin mucosa may crack and bleed even on careful examination. Malignant disease at the upper end of the œsophagus is much more common in women than in men, as borne out by Logan Turner's statistics. It may occur very early—in one case at the age of 23; it is almost always squamous-celled epithelioma. The so-called œsophageal pouch always has its point of origin in the laryngeal-pharynx above the upper opening of the gullet.

## 2. Affections of the Lower Segment of the Œsophagus—

WALTER G. HOWARTH, M.A., M.B., F.R.C.S. (London).—The manifestations of disease in this section of the gullet are usually due to cicatricial or compression stenosis and to the various forms of malignant disease, or, are a complex variety of phenomena of nervous origin. Dysphagia is in all types the prominent symptom; regurgitation of food is usual. Irritable cough may be present, as also hiccup, choking sensation, and a feeling of suffocation; excessive salivation is also sometimes troublesome. Select from and group these symptoms as we will, however, it is impossible to present a clinical picture that is pathognomonic of any single condition. Dysphagia to solids is more usual in organic strictures, and dysphagia to fluids in achalasia and allied conditions; a varying dysphagia is more common in nervous disorders.

The earliest symptoms of disease of the lower end of the œsophagus may be referred to the upper, so that sudden choking attacks at the beginning of a meal may be the first sign of disease in the phreno-cardiac segment. X-ray examination should be conducted in the presence of the surgeon; thickish bismuth emulsion being used, as the bismuth cachet is valueless and misleading. In the nervous group of cases the shadow is broad, regularly conical, or with a round end that bends to the left. In malignant stenosis the shadow does not present a smooth outline but is often irregularly notched and funnel-shaped. The injection of 4 grams of papaverine will cause immediate

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relaxation in spasmodic cases. The triangular space behind the œsophagus as it turns forward and to the left to enter on the diaphragmatic part of its course should be particularly noted — in malignant cases this space is often obliterated, while in spasmodic cases it is clear.

Dr A. BROWN-KELLY (Glasgow) said that in cardiospasm the œsophagoscope reveals the normal opening and closing of the hiatal œsophagus as long as the tube is kept at least 3 cm. above the hiatus, but when it is pushed 1 or 2 cm. further, the wall of the hiatal œsophagus gathers itself together so that the mucous membrane forms a closed rosette. This closure becomes firmer when the tube is pressed down more firmly. If moderate pressure is maintained for about a minute the closed œsophagus usually yields and the tube glides into the stomach. Hypertrophy of the sphincter does not as a rule occur, because the spasm is intermittent. His conclusions are :—

1. That the obstruction at the lower end of the gullet in the affection, commonly termed cardiospasm, is due to spasm.
2. That the spasm is predisposed to by a state of irritability of the muscle fibres, or of the nervous mechanism controlling them.
3. That all the endoscopic appearances are against the theory of achalasia.

Sir St Clair Thomson, Dr W. S. Syme, and the President, Dr Macintyre, also took part in the discussion. T. RITCHIE RODGER.

## THE SCOTTISH SOCIETY OF OTOTOLOGY AND LARYNGOLOGY.

EXTRAORDINARY MEETING HELD IN THE WESTERN INFIRMARY, GLASGOW.

July 28, 1922.

*President.*—Dr J. G. CONNALL.

**Demonstration upon Analysis of Sound by Resonance.**—Mr GEORGE WILKINSON—(See *Journ. of Laryngology*, September 1922).

**The Relations of the Optic and Vidian Nerves to the Sphenoidal Sinus.**—Dr GAVIN YOUNG—(See *Journ. of Laryngology*, December 1922.)

**Two patients with Malignant Disease of the Nose. Lateral Rhinotomy**—Dr J. G. CONNALL.

1. Female, aged 45, with right nasal obstruction of one year's duration, associated with discharge and bleeding. Pain and swelling over right side of nose and cheek; vascular growth in right nostril; squamous epithelioma on section. Lateral rhinotomy on 6.11.19.

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2. Female, aged 72, with nasal obstruction of a few months' duration; absence of pain and bleeding. A hard gristly growth in left nostril was extensively invaded by squamous epithelioma.

Dr WRIGHT (Bristol), congratulated Dr Connal on the first case, and directed attention to the fact that the patient had shown evidence of chronic infection in her accessory sinuses for some years before the malignant disease was recognised. He believed that malignant disease was a not very uncommon result of prolonged infection in the nasal accessory sinuses, as it was in the middle ear.

## **Web (Congenital ?) in Larynx of Boy, aged 6—Dr J. G. CONNAL.**

Dr CONNAL was inclined to delay interference, for the reason that the boy had only a slight disability in the way of a little roughness in the voice. The chest development was good.

Sir WILLIAM MILLIGAN (Manchester), thought it would be very much better to leave the patient alone. The web was in the anterior commissure and was very concave posteriorly, and would probably not give him much trouble; if divided, it would be extremely difficult to prevent re-adhesion.

Dr ANDREW WYLIE (London), agreed that the condition should be left alone, and that on no account should the galvanic cautery be used. He had used it with terrible results—great cicatrisation afterwards—and the patient was made three times worse than before.

## **Multiple Telangiectases of Skin and Mucous Membranes—**

Dr A. BROWN KELLY.—Woman, aged 55, had been subject to epistaxis since girlhood, the attacks becoming more frequent and severe. Telangiectases were noticed on the cheeks years ago. Others were present on the lower lip and right ear and several on the right side of the septum anteriorly, which were the sole source of bleeding. Small ones existed on anterior ends of right middle and inferior turbinates and a few on the dorsum of tongue, and faint traces on the palmar surfaces of the finger tips. Patient's mother, and a brother of the latter, died in consequence of nasal hæmorrhage. Other relatives have suffered from epistaxis, including her mother's father, an uncle, a brother, and a son.

Dr W. S. SYME wished to issue a word of warning. He had a similar case where the telangiectases appeared more on the septum than elsewhere. He performed submucous resection, thinking that the cicatricial tissue formed afterwards would help to obliterate the veins. The condition had become aggravated.

Sir WILLIAM MILLIGAN thought radium should be used. It would be a troublesome case, and there were a good many places where it would have to be applied. The action of radium upon the inner coat of a blood vessel was such that it would crumple it up and prevent hæmorrhage. Where the hæmorrhage was serious it would be worth while trying it, beginning at those places where it was most troublesome and using a fairly stiff dose.

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Dr BROWN KELLY said the usual tendency in such cases was for the telangiectases to increase in number and size and for the hæmorrhages to become worse. He was obliged to Sir William Milligan for his suggestions, but years ago, in a worse case, he had tried radium; although it helped somewhat, the patient died from loss of blood.

**Prolapse of Left Laryngeal Ventricle**—Dr A. BROWN KELLY.—Woman, aged 45, has been husky for six years and slightly breathless of late; there is no history of colds, overuse or abuse of voice, or injury. An ovoid, smooth, red growth emerges from the left ventricle, concealing the whole of the left true cord and about the anterior half of the right. On suspension laryngoscopy, the upper surface of the growth is found to be continuous with the upper surface of the ventricular band, the two being demarcated by a shallow furrow. The growth, when raised, is seen to be separate from the underlying true cord, and from the floor of the ventricle. Its consistence is that of a polypoid hypertrophy. It can be pushed outwards into the ventricle, but immediately escapes again when pressure is relaxed. The appearance closely resembles that of prolapse of the left ventricle shown in Fig. 10, illustrating Irwin Moore's paper (*Journal of Laryngology and Otology*, July 1922).

Sir ST CLAIR THOMSON suggested that the case should be entitled "So-called" prolapse of left laryngeal ventricle.

Dr BROWN KELLY said it could be easily removed. The condition was merely a continuation downwards of the edge of the false cord and was not coming from the inside of the ventricle.

**Accessory Thyroid (Cystic) at Base of Tongue**—Dr W. S. SYME.—Female, aged 61. The swelling was first noticed about ten years ago. The only disability is some thickness of speech. The growth is spherical, about the size of a hen's egg, pinkish in colour, and there are some fair-sized veins coursing over it. In some places it is of firm consistence, in others it appears cystic. The patient has suffered for thirty years from recurring attacks of hæmatemesis, without any gastric or other cause. It is suggested that the hæmorrhage arises from the enlarged veins on the surface of the swelling. The question of removal is at present held in abeyance.

Dr P. M'BRIDE asked Dr Syme if he was quite sure that this was a thyroid tumour. The only case of similar appearance in a man, which he had seen, turned out to be a lipoma. There was at first the feeling of a foreign body in the throat, but little real trouble. An attempt to remove it with a cold snare failed to cut through the base, so that it had to be detached by means of scissors. It recurred, and was then completely removed with the electric cautery. He had seen a second case of lipoma in the same year, and, at that time, there were only three other cases previously reported.

Dr LOGAN TURNER had shown at the June Meeting of the Society a case exactly similar to that now exhibited by Dr Syme. A piece of tissue

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removed for microscopic examination revealed thyroid gland structure. It seemed unnecessary to remove the tumour as there was no troublesome symptoms.

Mr WILKINSON (Sheffield) said he had had a case of accessory lingual thyroid with a second accessory thyroid in front of the hyoid bone: the patient was anxious to have something done. It became a question of removing one or other of the accessory thyroids, because he was not sure if there was any real thyroid. He removed the one which he thought was capable of causing the symptoms.

Dr W. S. SYME was much interested in Dr M'Bride's remarks. He thought that the tumour was too pink or red in colour to be a lipoma. He could demonstrate no thyroid mass in the neck. If it were a lipoma it should be removed, but if thyroid tissue, the question of its removal required more consideration.

**Cerebellar-pontine Tumour. Removal by way of the Mastoid and Labyrinth. Death four days later**—Dr W. S. SYME.—Female, aged 27. She was first seen on 7th March 1921, complaining of deafness in the right ear. Occasional tinnitus was also present. The hearing in the right ear was—Watch, 6/40. Bone conduction was good; there was no giddiness, no nystagmus, and the tympanic membrane was normal. There was no history nor sign of present or former suppuration. The Eustachian tube was patent, and inflation led to no appreciable improvement. The throat and nose showed no marked abnormality. A diagnosis of early otosclerosis was made.

On 15th March 1922, she consulted Dr Lewis M'Millan because of increasing blindness. He found optic neuritis on both sides, the left being the more advanced, and passing into atrophy. There were erratic blind-spot fields. Diplopia was present. On 16th March, Dr T. K. Monro reported that she had suffered for eight months from headaches and sickness; the headaches, usually severe, awakened her from sleep and might last from twelve to twenty-four hours; they were associated with throbbing. Diplopia had been present for a week. She has never had convulsions. All the organs are healthy; reflexes normal; smell and taste not defective; pupils equal. On 27th March 1922, again examined by Dr Syme. The deafness in the right ear had increased. About every four weeks she had a bad attack of giddiness and vomiting. The tinnitus is now masked by the throbbing. Right ear, Watch, 0/40, but bone conduction reduced. Hearing in left ear normal. With noise apparatus in left ear, loud conversation voice is heard by right at 2 feet. There is no contraction of the hearing field in the right ear as tested with the monochord. Nystagmus when eyes are turned to the right, and sometimes when turned to the left: rotatory nystagmus on looking up. The eyes are rotated, following the finger, in a jerky manner. There is paresis

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of the right sixth nerve. Vestibular reactions—Rotation, stimulating each ear in turn, gives good response. Caloric reaction (cold), almost no response in either ear. Dysdiadokokinesia of right forearm. There is a very slight right facial paresis. No sensory paresis could be detected. 28th March, lumbar puncture. Fluid clear but under greatly increased pressure (subsequently found to be sterile). A diagnosis of tumour in the region of the right internal auditory meatus or of the right cerebellar-pontine angle was made. Operation, 3rd April, the mastoid was opened, the lateral sinus exposed, the posterior wall of the mastoid and the labyrinth removed up to the internal auditory meatus, no attempt being made to save the facial nerve. On reaching the internal auditory meatus, there was a very free flow of cerebrospinal fluid. Free bleeding occurred from the superior petrosal sinus. The dura was now opened, and with the finger through the opening a firm growth, of the size of a walnut, was felt deep in towards the apex of the petrous bone. Owing to patient's collapsed state further interference postponed. 6th April, cerebellum retracted and tumour enucleated. Firm, smooth, and the size of a walnut, in structure it proved to be a cellular and very vascular glioma. Though the post-operative condition of the patient was very satisfactory, she died somewhat suddenly on 10th April.

Sir WILLIAM MILLIGAN thought that the appearance of this case at such a meeting was an extraordinary indication of the progress of the aural surgeon. As aurists, we saw a fair number of these cases, but we did not diagnose them as such. The patient, complaining of very slight deafness, or possibly of some form of tinnitus, first consulted the aurist. An exact diagnosis at the moment was of course quite impossible. In the course of about a year and a half the patient next consulted the eye specialist, as by that time there was probably some definite sign of loss of vision and possibly some atrophy. Even then it was not at all easy to say what the actual lesion was. Another period elapsed in which there was a steady reduction of vision and hearing, and then slight evidence of intracranial pressure, and the patient really became ill, but, unfortunately, at this stage it was very seldom that the aural surgeon saw the case. One of the most important nerve symptoms was the effect of the growing tumour upon the fifth nerve. When a diagnosis of tumour has been made, either cerebello-pontine or an auditory nerve tumour, the question arose as to how it should be dealt with. He believed that they should be removed by the trans-cerebellar method, because in that way only had the surgeon sufficient access, seeing that the growth encroached into the "porus acusticus." It was of great importance too that in the earlier stages of the operation the lateral ventricle should be drained in order to relieve intracranial pressure. He wished to emphasise one other point. On account of the peculiar pathological course of events, and the invasion of the "porus acusticus," it was probably, from a surgical point of view, inadvisable to try to remove the growth entirely. In that case, as much of the growth as possible should be removed. The serious thing in a situation such as this

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was the hæmorrhage. It was a very severe and grave complication from the point of view of the patient.

Dr SYME thought it possible, if another case occurred, he would prefer the trans-cerebellar route, if he was quite sure he was dealing with a tumour of the cerebellar-pontine angle.

**Two Cases of Simple Stricture of the Œsophagus to emphasise the value of the Œsophagoscope in the Treatment**—Dr W. S. SYME.—Two boys, aged 6 and 12 respectively, suffered from stricture, 8 to 9 inches from the upper incisors, as the result of swallowing caustic soda, sixteen and eight months previously. In the first case, a second stricture existed one inch below the first. In both cases the œsophagoscope revealed the upper end of the stricture as a small pit on the top of a pyramid, the œsophagus being dilated all round. Before it was possible to pass a fine bougie into the stricture it was necessary to anchor the pyramidal projection by passing the inner tube of the œsophagoscope. The strictures had been dilated.

Dr SYME wished to know how long it would be necessary to continue the use of bougies, and what hope he could hold out to these patients. At first he bougied once a week and then every four weeks; then he delayed for a month, and now he operated every six weeks. The second case had a fair passage way.

Sir ST CLAIR THOMSON said that we did not have the experience which they had in America in this connection, as it seemed to be a very common occurrence for the children there to drink lye. He got the impression in making a short visit to Chevalier Jackson's clinic that he passed the bougie once or twice a week. Perhaps Dr Hall Forbes could tell them more about this.

Dr HALL FORBES (New York) said that in reference to the actual technique followed, it was on the lines which Sir St Clair Thomson had already mentioned. They did not hesitate, in the early stages, to pass the instruments twice a week for probably six or seven weeks, depending on the amount of dilatation; after that, from intervals of ten days or two weeks, increasing the intervals—once in six months and once a year in very long cases. The idea was to work them up rather rapidly and then keep them open. He thought there was some irritation in the strictures of the nature of small ulcers. They had found a great deal of benefit at the time of bougieing in making an application of nitrate of silver in rather strong doses. This helped to prevent contraction.

Cases were also shown by Mr James Russell, Drs John W. Leitch, W. Charles Macartney, and G. B. Brand.

## ABSTRACTS

### EAR.

*An Effective Local Anæsthetic for the Tympanic Membrane.* CITELLI.  
(*L'Oto-Rhino-Laryngologie Internationale*, May 1922.)

The solution advised is menthol, 2 grams, liquid vaseline, 100 grams, chloretone, 8 grams. Five or six drops are instilled for ten minutes before operation. It is claimed to be non-irritating, non-toxic, and painless.

A. J. WRIGHT.

*Recent Observations on the Treatment of Chronic Otorrhœa and of Deafness following Otitis Sicca.* Professor SCHÖNEMANN. (*Archives Internationales de Laryngologie*, March 1922.)

The purpose of this article is to recommend the insufflations of powders "per tubam" in the treatment of chronic purulent otorrhœa and in dry middle ear catarrh. The author uses two powders—xoeform (bismuth base) and vioform (iodine base), which he insufflates through a Eustachian catheter of wide bore.

In children it is possible to introduce the powder by politzerisation.

MICHAEL VLASTO.

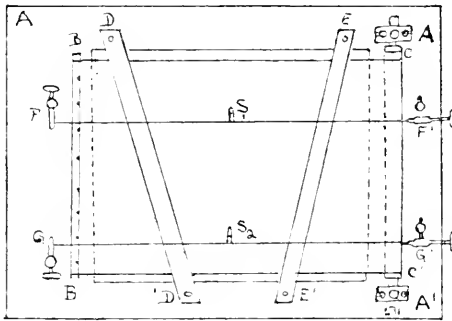
*Experimental Confirmation of the Cotugno-Helmholtz Theory of Sound Perception.* A. STEFANINI. (*Archiv. Italiennes de Biologie*, December 1915, and *Archiv. Italiano de Otologia*, Vol. xxvi., fasc. 5, 1915.)

Stefanini's model consists of a sort of roller blind, of "waxed" linen (architect's tracing fabric), stretched at an approximately even tension. A trapezoidal section of the blind is clamped by two converging bars of metal. The parallel sides of the blind are free. This furnishes the experimenter with a membrane, stretched transversely, and differentiated regularly and progressively for length. By an ingenious device he uses as indicator two very small mirrors carried on threads of silk stretched across the membrane. The end of each mirror is attached to the membrane. Any movement of the membrane is recorded by the mirrors, which rotate around the silk which carry them. A beam of light reflected from the mirrors on to a screen magnifies their movements. The breadth of the membrane at the level of attachment of the lower mirrors is rather more than a half of that of the level of the upper mirrors. He found that the membrane was thrown into vibration by different notes at the two levels, the difference of pitch of the exciting tones being rather less than one



octave. A similar result followed when the membrane was immersed to a depth of 2 mm. in a basin of water. His experiments provide a very pretty demonstration of the fact that a non-extensible membrane, stretched transversely, conforms in its vibrations to the formula  $n = \frac{1}{2l} \sqrt{\frac{t}{m}}$  at all events, so far as the factor  $l$  is concerned. This is what is assumed by Helmholtz, and is what one would expect to be the case.

Stefanini's experiment was designed, he tells us, to confute the misleading experiments of Ewald, whose membrane was not differentiated for (transverse) length, and of both Ewald and Lehmann in so far as both of them used stretchable rubber membranes, which are not capable of having transverse, without, at the same time, having



B B<sup>1</sup> Linen fixed here and passes round roller C C<sup>1</sup>. Ratchet A A<sup>1</sup> prevents roller from slipping. D D<sup>1</sup> and E E<sup>1</sup> are clamps limiting vibrating segments of linen. S<sup>1</sup> and S<sup>2</sup> are mirrors carried by silk threads F F<sup>1</sup> and G G<sup>1</sup> registering vibrations of the linen.

longitudinal tension. His claim in this respect appears to be well founded. His model takes no account of the factors of graduated tension or graduated mass, and consequently falls considerably short of being a complete representation of the resonance mechanism of the basilar membrane. His experiment with the membrane immersed in water to a depth of 2 mm. in an open bowl does not in any way illustrate the part the water plays in modifying the resonant action of the membrane. Within the limits of its applicability his experiment is well devised, and, as he says, the apparatus with which it is performed is comparatively simple. The mechanical factors present in the cochlea cannot, however, be adequately reproduced in so simple a fashion, and the simplicity of the apparatus is in proportion to its incompleteness. The differentiation of the fibres of the basilar membrane for length amounts to only some such proportion as 3 to 1 (Keith). This would only account for a range of pitch of about 1½ octaves. To obtain a

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range of  $10\frac{1}{2}$  octaves, such as the cochlea possesses, by differentiation in length only of the fibres, would require an increase of some 1500 from the shortest to the longest. G. WILKINSON.

*New Types of Acoumeter.* R. PAPALE. (*Arch. Ital. di Otol.*  
Vol. xxxiii., March 1921.)

This article describes two types of acoumeter, the principle of which is the gradual dispersion of sound conducted along a tube by means of openings in the side. The first model consists of two metal tubes, one fitting tightly into the other. The outer tube has a series of lateral openings arranged in a spiral. By adjustment of the inner tube as many openings may be left free as are desired. This device is inserted in the rubber tube leading from the source of sound (watch). The other end of the tube is connected with the ear to be tested. By uncovering more and more of the holes the sound is progressively weakened, or *vice versa*. The second model has two tubes placed end to end which can be moved gradually out of alignment by means of a screw. The author claims great accuracy for this method of acoumetry. J. K. MILNE DICKIE.

*Researches on the Function of Hearing, with an Especial Study of Pathological Shortening of Bone Conduction in Syphilitics with apparently Normal Hearing.* R. LUND. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 4.)

Schwabach's test discloses shortening of bone conduction in 30 to 40 per cent. of cases of acquired syphilitics whose hearing for the whispered voice is apparently normal. The defect may appear as early as a month after infection, and is found with about the same frequency in the later stages of the disease. Once established it is permanent, and is very little influenced by anti-syphilitic treatment. Cases of endo-cranial syphilis are most affected. In spite of the apparently normal hearing, the loss of bone conduction is accompanied in many cases by other signs, such as a lowering of the upper tone limit and shortening of air conduction.

The author's investigations show that the shortening of bone conduction is not due to an increase of the tension of the cerebro-spinal fluid, but that it does show a definite relationship to pathological changes in the cellular and chemical constituents of the fluid. It is therefore probable that it is due to inflammatory changes set up by the syphilitic toxin in the cochlear nerve or its endings in the labyrinth. THOMAS GUTHRIE.

## Ear

*Clinical Observations directed to elucidating the Question of Syphilitic Neuro-Labyrinthitis.* R. LUND. (*Acta Oto-Laryngologica*, Vol. iii., fasc. 4.)

A number of characteristic cases are related, and among the points upon which the author lays stress is the discrepancy or "Dissociation" sometimes found between the caloric and rotatory reactions. This dissociation showed itself in two-thirds of the author's cases of acquired and three-fourths of his cases of congenital syphilis, and took the form of absence of the caloric with persistence in the same case of the rotatory reaction, or inversely, presence of the caloric and absence of the rotatory. This dissociation is met with so rarely in vestibular affections due to causes other than syphilis, that it is to be regarded almost as "pathognomonic."

Reference is made to the fistula symptom of Hennebert, and the author suggests that when it is present, and is associated with the fistula symptom of Mygind and with a negative Rinne's test, the triad should be called the "Syndrome of Hennebert." This triad is pathognomonic for neuro-labyrinthitis due to congenital syphilis, and each of the three symptoms depends on the same pathological process, namely, a gummatous osteitis in the capsule of the labyrinth about the margin of the fenestra ovalis. THOMAS GUTHRIE.

*Contribution to the Pathological Anatomy of Acquired Deaf Mutism.*

LUDWIG LEDERER. (*Archiv f. Ohren-, Nasen-, u. Kehlkopfheilkunde.* Bd. 108.)

Lederer has studied the temporal bones of four deaf mutes who had repeatedly been examined clinically by Brock:—

CASE I.—G. S., aged 14, had been completely insensible to auditory and vestibular stimuli since the age of three. Changes of the following type were found in the temporal bones; normal drum-heads, new fibrous and osseous tissue in middle ear and labyrinth, ectasia of ductus cochleæ and membranous elements, and pigmentation of the stria vascularis. Degeneration of all neural elements except Scarpa's ganglion and vestibular rootlets, which were little atrophied, though the semi-circular canals were partly filled up and the ampullæ contained bulbous nerve fibres.

CASE II.—K. P. had been a deaf mute since the age of five, both ears having discharged for many years. He died at the age of forty-seven from meningitis secondary to right sinus thrombosis and left cholesteatoma.

The recent septic invasion had evidently been retarded by old-standing fibrous and osseous occlusion of the oval and round windows and basal turn of the cochlea. The organ of Corti and membrana tectoria were rudimentary on one side and destroyed on the other. A fistula of the right semi-circular canal was closed by fibrous tissue.

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CASE III.—A. V. had normal speech and hearing until 5 years of age, when an attack of cerebro-spinal meningitis resulted in loss of both faculties. There was no residual hearing; the drums were normal. Whilst attending the Erlangen clinic for multiple sclerosis he died of pneumonia at the age of 27.

Adhesions between stapes and promontory and neuro-epithelial atrophy and distortion of the membranous structures were well marked. There was much fibrous tissue in both scalæ, and an effusion of blood had occurred into the internal meatus and canals for the vestibular rootlets.

CASE IV.—G. R., a deaf-mute since childhood, died of rectal cancer when 45 years old. He was completely deaf and insensible to vestibular stimulation, probably as a result of epidemic meningitis. Histologically, there was filling of the cochleæ with compact bone to a remarkable degree, neuro-epithelial atrophy and degeneration of the acoustic roots.

Lederer attributes the hæmatoma in Case III. to an apoplexy *in articulo mortis*. Denker described a similar hæmorrhage in a congenital case, but here the bleeding extended further into the cochlea. Discussing the genesis of the bony filling of the cochlea, Lederer finds himself at variance with Herzog and Manasse. Manasse's distinction between suppurative otitis interna and periostitis interna ossificans, based on the continuity or otherwise of the new bone with the cochlear capsule, did not seem to hold good in Cases I. and II.

WM. OLIVER LODGE.

*Disease of the Otolith Apparatus.* ROBERT J. HUNTER, M.D., Philadelphia. (*Journ. Amer. Med. Assoc.*, 6th March 1922, Vol. lxxviii., No. 18.).

The author thinks this is the second case so far reported in literature, the first having been cited by Bárány. The clinical history is fully given, but does not lend itself well to abstracting. The interesting features of the case, Hunter says, are the following:—

- (1) The history of incidence of nystagmus after a blow.
- (2) The significant fact that this had continued for twelve years, and that except in his "favourite position" the nystagmus was constant, and that there has been no vicarious symptom of function such as we find after injury to the semi-circular canals.
- (3) The nystagmus was almost entirely absent in his "favourite position," but reappeared as soon as the head was moved from this plane, no matter how slowly and carefully it was moved. At the same time the past-pointing, which was normal in the "favourite position," became abnormal in other positions.

PERRY GOLDSMITH.

# Ear

*Temporo-Sphenoidal Abscess.* JAMES ADAM, M.A., M.D.  
(*Brit. Med. Journ.*, 24th June 1922.)

The points of interest in this case were that the abscess seemed to be double, a second abscess being evacuated by probing the day after the first was evacuated, and that no localising symptoms appeared till very late.

The case is compared with another under the author's care in which there was very marked aphasia, but in which, at the mastoid operation, the tegmen and the dura appeared so healthy that the brain was not explored. The symptoms disappeared gradually without intra-cranial operation, and the case was presumed to be one of subdural hæmorrhage.

T. RITCHIE RODGER.

*The Diagnosis of Brain Tumours by the Bárány Tests: Reports of Cases proved by Operation or Necropsy.* LEWIS FISHER, M.D., Philadelphia, U.S.A. (*Jour. Amer. Med. Assoc.*, 20th March 1922, Vol. lxxviii. No. 20.)

This paper calls attention to and emphasises the value of a complete ear examination as an aid to the neurologist and brain surgeon. Examination of a large number of brain cases over a period of many years has shown that lesions in certain positions produce a definite group of reactions to stimulation. Tumours in the cerebello-pontile angle give the most constant results, and in many cases this is the only means of accurate localisation. Fisher states that a tumour in this situation may be diagnosed by the Bárány tests years before any definite clinical symptoms appear.

The typical picture is as follows:—There is total deafness, with no response from the horizontal and vertical semi-circular canals on the affected side. On the opposite side the hearing is good, the vertical canal gives no response, while the horizontal canal reacts by nystagmus, vertigo, and past-pointing.

In tumours of the posterior fossa, the vertigo and past-pointing are elicited, while the nystagmus is normal or exaggerated.

Pituitary tumours exert their first pressure on the vestibulo-ocular tracts. Examination reveals an exaggerated nystagmus, but normal vertigo and past-pointing.

PERRY GOLDSMITH.

## LETTER TO THE EDITORS

THE EDITORS,

*Journal of Laryngology.*

SIRS,—Mr Wilkinson's model demonstrating the Resonance Mechanism of the Cochlea was presented at the Tenth International Congress of Otology held in Paris in July of this year, and was communicated to the Physiological Section of the British Association at their meeting at Hull in the following September. Mr Wilkinson was not acquainted with the model which was described by me in 1914, and it was in Paris that Gradenigo drew his attention to it. In the communication to the British Association he alluded to it, in passing, as follows: "Operating models have been previously constructed like those of Ewald, Stefanini, Lehmann, Lux, and Rolfe. I maintain that none of these represent adequately the conditions present in the cochlea, and the conclusion which can be drawn from them is either misleading or of very partial application."

It follows that Mr Wilkinson believes that my model cannot furnish a decisive demonstration of the functioning of the basilar membrane, to which structure his own apparatus approaches more closely in so far as the tension and the mass of the fibres vary, as well as their length. That his apparatus conforms more than any other to the structure of the basilar membrane is very true, but when I devised my model it was my intention to dispose of one of the most serious objections that were being made to the Cotugno-Helmholtz theory, objections which seemed to be confirmed by the results yielded by the Ewald acoustic camera, which appeared to show that it was impossible for the fibres of the basilar membrane to vibrate separately to various notes as they were so closely connected by the cellular membrane covering them. It was maintained in fact by the opponents of the theory, that this could only happen if each fibre acted independently.

It is strange that in the discussion that followed Mr Wilkinson's paper, whilst A. A. Gray, Ritchie Rodger, and Sir James Dundas-Grant recognised the decisive value of the demonstration, Professor Urban Pritchard declared that he still persisted in his old opinion which was, that the basilar membrane had nothing whatever to do with the perception of sound, because these fibres were not free, which they would have to be in order to function as resonators, and because, at the distal end of certain cochleæ, there was no basilar membrane but only an organ of Corti. In the course of the communication Mr Wilkinson had justly observed that in order to vary conveniently the mass of the fibres, all of which probably have the same density, and also in view of

## General Notes

their shortness, it was necessary that they should be "loaded" by an amount of fluid which varies as the distance of the fibres along the membrane from the basal end, and that it was therefore necessary for them to be united by an impermeable membrane. As I have already observed in my paper on the resonance theory, it can also be added that if the fibres were free, and each one of them responded to a single note, taking into account the limited number of them, a sound varying continuously in pitch would appear to ascend by steps, and not continuously. But though the various sections of the cloth inside my model are more closely connected with each other than the various sections of the basilar membrane, yet they vibrate separately and to specially determined sounds which are emitted in their vicinity, even when the cloth is immersed in water. It appears to me that this observation of mine is completely vindicated.

Mr Wilkinson's model is much more complicated, very difficult to construct, and very expensive. It only comprises the results which I had obtained with the simplest means. In addition, my model demonstrates the field of resonance for each fibre, which is perhaps not possible, at least not in the same easy and self-evident manner as in the Wilkinson model.

In any case I expressed the opinion, before the description of Mr Wilkinson's apparatus was published, that the result obtained from a model on lines, which conform more closely than mine to the structure of the basilar membrane, would suffice to vindicate definitely the Cotugno-Helmholtz theory and explain all the facts relative to the perception and analysis of sound.

A. STEFANINI.

PISA.

[The attention of the reader is directed to the Abstract on p. 634 describing Stefanini's model. Both the Abstract and the above Letter have been translated from the Italian version of the MS. sent to us.—EDS.]

## GENERAL NOTES

ROYAL SOCIETY OF MEDICINE.

1 *Wimpole Street, London, W.1.*

*Section of Otology*—President, Mr Hunter F. Tod, F.R.C.S.; Hon. Secretaries, Mr F. J. Cleminson, M.Ch., and Mr Archer Ryland, F.R.C.S. Ed.

The next Meeting of the Section will be held on Friday, 19th January 1923, at 5 P.M.

Members who propose to show patients, specimens, etc., should communicate with the Senior Secretary, Mr F. J. Cleminson, 32 Harley Street, London, W.1, at least twelve days before the Meeting.

## General Notes

*Section of Laryngology*—*President*, Mr Charles A. Parker, F.R.C.S. Ed. ; *Hon Secretaries*, Mr T. B. Layton, D.S.O., M.S., and Mr J. F. O'Malley, F.R.C.S.

The next Meeting of the Section will be held on 2nd February 1923, at 4.45 P.M.

Members desirous of showing patients or specimens should communicate with the Senior Secretary, Mr T. B. Layton, M.S., 10 Welbeck Street, London, W.1, at least twelve days before the Meeting.

An informal Meeting of the Section will be held on Friday, 5th January 1923, at 4.45 P.M. This Meeting has been arranged with the object of demonstrating and discussing cases in which a diagnosis has not been made.

\* \* \*

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, HULL, 1922.

Dr T. Ritchie Rodger has kindly sent us the following notes :—

At the Annual Meeting of the British Association held this year in Hull during September, several papers of interest to otologists and laryngologists were read before the Physiology Section.

Mr G. Wilkinson contributed a paper on "The Mechanism of the Cochlea," with special reference to the inertia of the contained fluids. It was illustrated by a demonstration of his working model showing the resonant vibrations of the immersed strings.

Dr T. Ritchie Rodger read a paper on "The Pathological Effects of Excessive Sounds on the Cochlear Apparatus, considered in Relation to the Theories of Sound Perception."

Professor W. Storm van Leeuwen contributed two papers :—(1) "Experimental Studies in Hypersensitiveness," and (2) "A Contribution to the Cause and Treatment of Bronchial Asthma, Hay Fever, and Allied Conditions." The last-named paper was much on the same lines as the protein reaction work done in this country, but the author relies for treatment largely on tuberculin in small doses and upon regulation of diet.

\* \* \*

At the Annual Dinner of the Medical Staff of the Central London Ear and Throat Hospital, Mr W. Stuart Low was the recipient of a handsome loving cup presented to him by his colleagues. The presentation was made by Dr Andrew Wylie on behalf of the staff. Mr Stuart Low has recently retired from active work at the hospital.

\* \* \*

We congratulate Dr Jean Guisez, Paris, a co-director of the *Bulletin d'Oto-Rhino-Laryngologie*, upon his promotion as Officer of the Legion of Honour.

\* \* \*

THE LATE EMERITUS-PROFESSOR A. CRUM BROWN, F.R.S.

On the 28th October, Emeritus-Professor Crum Brown passed away in his 85th year, fourteen years after his retirement from active professional life. A son of the manse, a half-brother of Dr John Brown, the author of the immortal *Rab and his Friends* and *Pet Marjorie*, and linked by family ties with P. G. Tait and Lord Kelvin, Alexander Crum Brown was a man



## General Notes

gifted with no ordinary mental powers and possessing wide and diverse interests in life. Although he occupied the Chair of Chemistry in the University of Edinburgh for a period of nearly forty years, his keen and active mind found many fields outside the immediate sphere of his professorial work wherein he could exercise his varied intellectual pursuits.

A few of the readers of the *Journal of Laryngology* had the great privilege of being his pupils in their undergraduate days. To the majority, however, his name is more closely associated with a line of investigation far removed from the domain of chemistry, but for the elucidation of which his intimate knowledge of anatomy, physiology, and physics provided a sound foundation. On 19th January 1874, he presented to the Royal Society of Edinburgh, "A Preliminary Note on the Sense of Rotation and the Function of the Semi-circular Canals of the Internal Ear," for which he was awarded the Keith Medal of the Society; and, in the same year, he published in the *Journal of Anatomy and Physiology* a fuller account of his researches on this subject.

Crum Brown put forward the view that the Sense of Rotation was a special sense quite distinct from all the other senses, and, being so, there was necessarily required a peripheral organ, a sensory nerve and a central organ. The structure of the semi-circular canals was such as to fit them to act as the peripheral organ in this connection. An identical explanation of the function of the canals had been given by Mach and Breuer shortly before Crum Brown's communication had been read. It was not, however, sufficient to meet the case, because, as the latter pointed out, a nerve current can vary only in intensity and not in kind, consequently, if irritated, it would convey the same message to the central organ, whether it was stimulated by right-handed or by left-handed rotation. For the solution of the difficulty, Crum Brown demonstrated that while one canal is affected by, and transmits the sense of rotation about one axis in one direction only, for complete perception of rotation in any direction about any axis, six semi-circular canals are required, arranged in three pairs, each pair having its two canals parallel (or in the same plane) and with their ampullæ turned opposite ways. Each pair would thus be sensitive to any rotation about a line at right angles to its plane or planes, the one canal being influenced by rotation in the one direction, the other by rotation in the opposite direction. Such was the arrangement in man; and in all the animals which he had examined, the external canal of one ear was very nearly in the same plane as the external canal of the other, while the superior canal of one was nearly parallel to the posterior canal of the other. In this way alone was it possible to harmonise the bilateral symmetry of the two ears with the condition, viz., that each of the three axes shall have two oppositely turned canals in planes at right angles to it.

\* \* \*

The Editors of the *Journal* desire again to express their indebtedness to, and their cordial appreciation of the work of Dr Douglas Guthrie and his staff of collaborators, in the voluntary assistance which they have given throughout the year, in abstracting the current medical literature bearing upon the specialty.

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## LIST OF ABSTRACTORS.

Brady, A. J., Sydney.	Martin, G. Ewart, Edinburgh.
Campbell, Andrew, Johannesburg.	Rodger, T. Ritchie, Hull.
Cleminson, F. J., London.	Sewell, Lindley, Manchester.
Dickie, J. K. Milne, Ottawa.	Tweedie, Alexander, Nottingham.
Dickson, E. D. Dalziel, Edinburgh.	Vlasto, Michael, London.
Dundas-Grant, Sir James, London.	Watson-Williams, E., Bristol.
Goldsmith, Perry, Toronto.	Wilkinson, G., Sheffield.
Guthrie, Thomas, Liverpool.	Woodman, Musgrave, Birmingham.
Horgan, James B., Cork,	Wright, A. J., Bristol.
Layton, T. B., London.	Yearsley, Macleod, London.
Lodge, W. Oliver, Halifax.	Young, Gavin, Glasgow.
M'Kenzie, Dan, London.	

\* \* \*

The *Journal of Laryngology and Otology* exchanges with the following periodicals :—

The Lancet.	La Presse Médicale.
Medical Press and Circular.	L'Oto-Laryngologie Internationale.
Proceedings of Royal Society of Medicine.	Revue de Laryngologie, d'Otologie et de Rhinologie.
The British Medical Journal.	Archives Internationales de Laryngologie, etc.
The Bristol Medico-Chirurgical Journal.	Annales des Maladies de l'Oreille, etc.
St Bartholomew's Hospital Journal.	Münchener Med. Wochenschrift.
The Glasgow Medical Journal.	Archiv. f. Ohrenheilkunde.
Archives of Radiology.	Monatsschrift f. Ohrenheilkunde.
The Medical Journal of Australia.	Finder's Internationales Centralblatt für Laryngologie.
The New York Medical Journal.	Zeitschrift für Hals-, Nasen-, und Ohrenheilkunde.
Journal of the American Medical Association.	Centralb. f. Ohrenheilkunde und Rhino-Laryngologie.
Journal of Ophthalmology, Otology, and Laryngology.	Archivii Italiani di Laryngologia.
The Laryngoscope.	Archivio Italiano di Otologia.
Department of Literary Research, American College of Surgeons.	Acta Oto-Laryngologica.
Bulletin d'Oto-Rhino-Laryngologie.	

\* \* \*

The Editors will be glad to receive from writers of papers published in Journals other than the above, a short "Author's Abstract" containing the main points in their communication.

\* \* \*

At the recent General Election, Sir William Milligan, Liberal candidate for Salford West, failed to obtain the seat, and Mr Somerville Hastings was defeated as Labour candidate for Epsom.

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(*Ed.*)=Editorial

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